ELECTRICAL SOUTH

Serving the 18 Southern and Southwestern States

Electrical South Data Sheets—a new feature beginning this month, pg. 34

FEBRUARY, 1954

Backed by powerful National Advertising

- 4 sizes: 5000 to 16000 CFM
- Automatic Ceiling Shutter
- Famous Hunter features throughout

Easiest to sell · Easiest to install

1954 HUNTER Package Attic Fan

Write for new 1954 Catalog

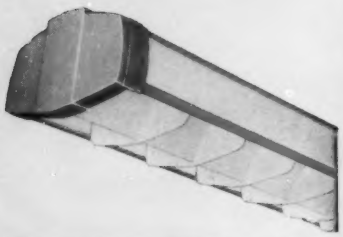
Hunter SINCE 1886

HUNTER FAN AND VENTILATING COMPANY

392 S. Front St., Memphis 2, Tenn.

Supreme Market, Boston, Mass. Electrical Contractor: Massachusetts Electric Construction Company, Boston, Mass. Distributor: Graybar—Boston

Wakefield Grenadiers with Spots Do a Super Lighting Job in a Boston Super Market



The Grenadier is a finely engineered louvered unit with metal-framed plastic side panels. All metal parts finished in metallic satin. Shielding 35° normal to the lamp and 25° parallel. Stem, canopy or on-ceiling models—for pre-heat and Rapid Start bipin or Slimline lamps.

The owners of the Supreme Market in Boston were not willing to settle for ordinary lighting. Instead they demanded and got an over-all lighting installation which sets a new standard for super markets.

A total of 186 Wakefield two-lamp Grenadiers are installed in seven continuous rows, with 123 Grenadier Spots located in line at 4 and 8 foot intervals as the situation demanded. Lamps used are CW/de Luxe. Walls above counters are painted in light pastel colors. Ceiling is aluminum. Floor is light cream terrazzo.

Here are the ft-c. readings after 200 hours of burning:

General lighting between rows, less spotlights, 50 ft-c.

Bakery shadow boxes, small, 115 ft-c.

Bakery shadow boxes, large, 175 ft-c.

Vegetable counters, 200 ft-c.

Displays at ends of regular goods shelves on cross aisles, 300 ft-c. on high levels; 400 ft-c. 7 feet from the floor.

Dairy goods, cheese, etc., upper level, 250 ft-c.; lower level, 400 ft-c.

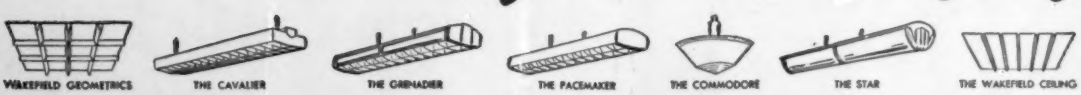
Ice Cream section, 300 ft-c.

Frozen meat, fish, etc., 100 ft-c.

Meat cutters, 200 ft-c.

For full information, write to The F. W. Wakefield Brass Company, Vermilion, Ohio. In Canada, Wakefield Lighting Limited, London, Ontario.

Wakefield Over-ALL Lighting



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Volume 34 Number 2

don't flip a coin...

TO CHOOSE CONNECTORS FOR TAPS OR JUMPERS!

Specify ANDERSON

HIGH-TENSILE STRENGTH *Aluminum* PARALLEL CONNECTORS

1, 2, 3, and 4 U-BOLT TYPES

Aluminum to aluminum or aluminum to copper, for *either* cable combination, specify parallel connectors *on the basis of performance!* ANDERSON cast aluminum electrical products are designed, engineered and manufactured to "performance standards" *determined by the most exhaustive tests ever devised for power system applications.*

Before you consider parallel connectors *again*, investigate ANDERSON'S wide range of sizes . . . you may be specifying similar type connectors in sizes much larger than necessary or practical.

LCA-70 A.C.S.R. or Aluminum Cable to A.C.S.R. or Aluminum Cable
LCC-70 A.C.S.R. or Aluminum Cable to Copper Cable

LCU-600 A.C.S.R. or Aluminum Cable to A.C.S.R. or Aluminum Cable
LCU-650 A.C.S.R. or Aluminum Cable to Copper Cable

DESIGN MEANS QUALITY *Plus* STRENGTH in the RIGHT PLACES!

Consult one of our nearest 20 representatives or contact our main office.

Aluminum & Bronze **POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES for SUBSTATION • TRANSMISSION • DISTRIBUTION SYSTEMS** *for over a Quarter Century*

ANDERSON BRASS WORKS, INC.

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA

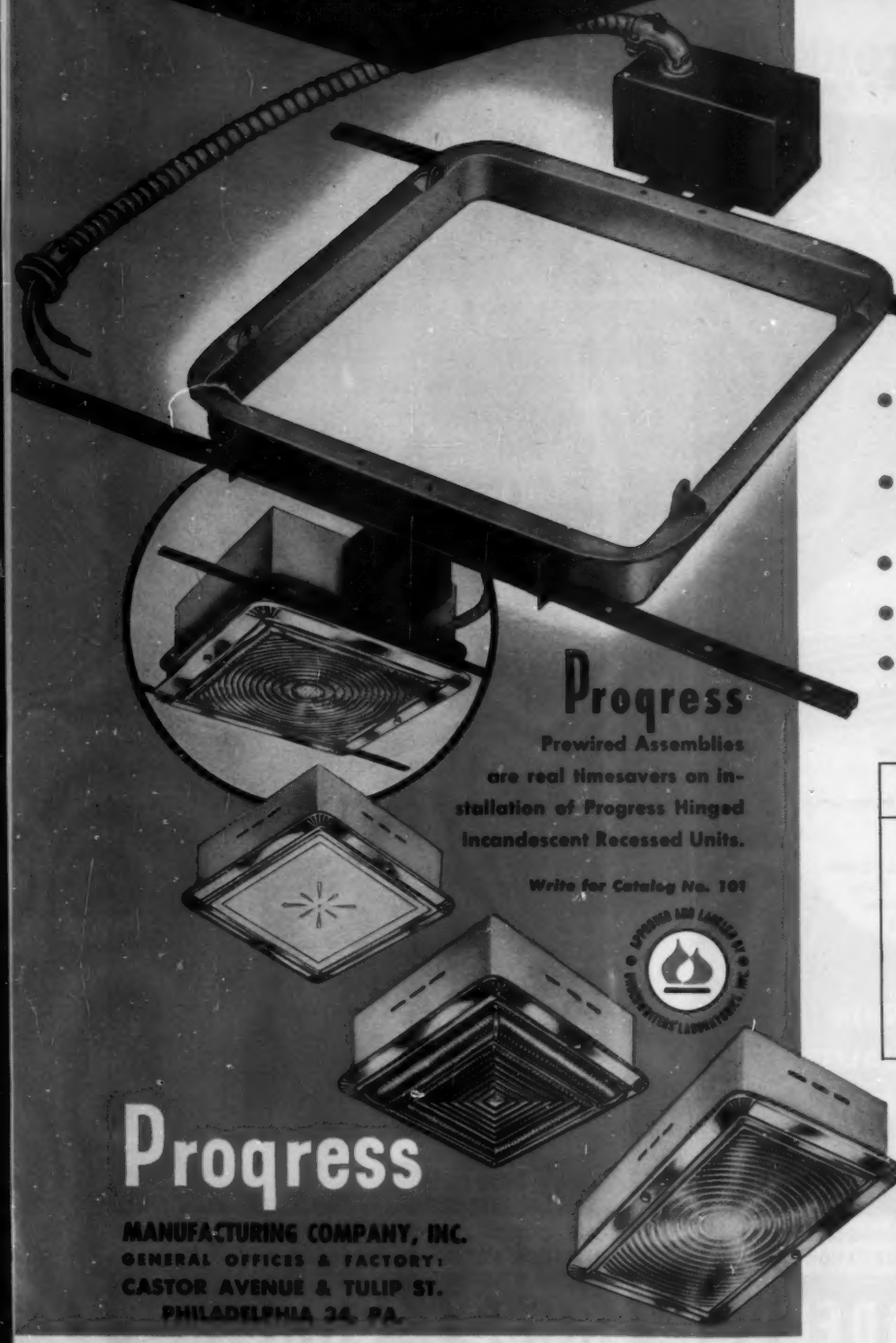
HERE'S WHAT YOU'VE BEEN WAITING FOR!

Progress PREWIRED ASSEMBLIES

. . . For all Progress Hinged Incandescent Recessed Units

- House wire can be brought directly into junction box.
- No asbestos or slow-burning wire required.
- No additional pull boxes required.
- Junction box readily accessible.
- Approved by Underwriters' Laboratories, Inc.

Write for Bulletin No. PV1-54

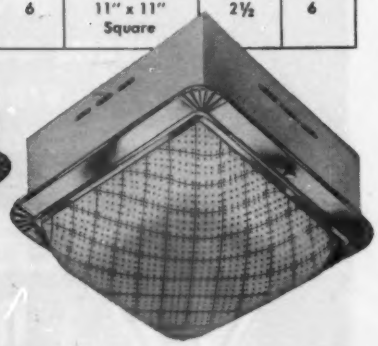


Progress

Prewired Assemblies are real timesavers on installation of Progress Hinged Incandescent Recessed Units.

Write for Catalog No. 101

Cat. No.	Type of Unit	Approx. Ship. Wt. Lbs. Ea.	Min. Ordering Quantity
2	6¾" x 6¾" Square	2½	6
3	4¾" x 7¾" Rectangular	2¼	6
4	8¾" x 8¾" Square	2½	6
5	6¾" x 10¾" Rectangular	2½	6
6	11" x 11" Square	2½	6



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ELECTRICAL SOUTH

SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

February, 1954 — Vol. 34—No. 2

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TO HELP THE BUSY READER—

A wide range of both "how-to-do-it" and reference type of material relating to the electrical trade will appear in a series of **Electrical Data Sheets** to be published regularly, beginning with this issue. Wiring design, equipment applications, estimating, installation, testing, and maintenance will be covered in data sheets of a size that can be filed conveniently in a pocket-size looseleaf book. The first data sheets, constituting a brief guide to **electrical maintenance** will be found on **pages 35, 38 and 40.** Next month, the first in a series on electrical estimating will be published.

With labor costs representing such a substantial part of the cost of electrical installations, the electrical contractor must study his operations constantly to determine ways and means of accomplishing more efficient use of his labor and materials. One contractor tells how the use of a **conduit bender reduces costs. See page 22.**

Nearly every industrial plant electrical engineer has faced the problem at one time or another of how best to **protect three-phase motors against "single-phasing."** A well-known power engineer surveys the equipment available for this purpose and directs attention to a specialty item that has been found particularly effective. **Page 20.**

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LOCKED IN PERFECT ALIGNMENT

Uni-Race sections slide into a firm telescopic union with coupler forming a rigid channel that will not distort (even before screws are added) and assures perfect fixture alignment.

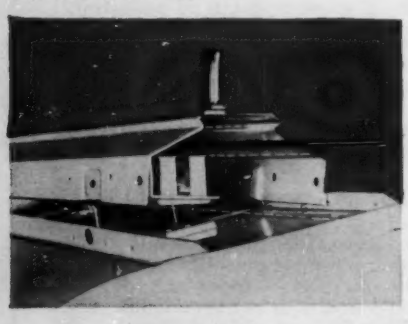
THE NEW

ortho-77

Reg. U. S. Pat. Off. Applied For

RIGID CHANNEL ANCHOR

Light in weight, readily accessible and easily mounted, the Uni-Race provides a rigid channel anchor for all Ortho-77 models. Being machined to exceptional tolerances, it automatically provides for exact fixture spacing.



PLUG-IN SOCKET

Ortho-77 units are wired to a Plug-In Socket which makes contact with a receptacle in the Uni-Race when fixture is closed. Fixture becomes completely dead when open, and being wired in parallel circuits, does not disturb other fixtures when removed.

WITH UNI-RACE

Acclaimed by lighting experts everywhere as "ushering in a new era in fluorescent fixture design"; the spectacular new Ortho-77 by Gibson is an entirely new concept of fixture design. Incorporated for the first time on any fluorescent fixture are a multitude of features that simplify installation, provide position alignment and spacing and give greater fixture rigidity. Now without tools and in a matter of minutes you can change fixtures instead of ballasts . . . raise lighting levels from two to four light or vary the levels as conditions demand . . . install fixtures at intervals automatically spaced and fill in quickly and easily as needed. Contractors have claimed as much as 50% saving in installation time with the Ortho-77 which means that you, the user, can install this revolutionary fixture incorporating the new Uni-Race, "V" type integrated construction, simplified plug-in wiring and many other features at no greater cost than a conventional installation. See it at your jobber today or write for bulletin Ort-101 for complete information.

GIBSON Manufacturing Co.

1919 Piedmont Circle, N.E. Atlanta, Georgia

Economic comment

by J. Whitney Bunting, Ph.D.

Highway taxation

◆ OHIO's desire to tax out-of-state truckers as well as local operators has touched off a veritable feud between many states through which Ohio trucks pass and Ohio itself. The crux of the problem stems from the fact that increasing highway traffic has caused increasing deterioration of the highways and has posed a major cost problem upon already overworked state funds.

For many years the large trucks carrying full loads of freight have been the targets for a great deal of friendly and unfriendly humor and comment. Their operation in some areas has caused a serious reduction in pleasure from "pleasure-car" travel. Much of the comment is unjustified for trucks on public highways are frequently better observers of driving conditions and regulations than those who motor in passenger cars. But large trucks have been charged with highway destruction as well as other major faults.

Effect is far reaching

Before questioning the equity of the Ohio tax law, two points should be made in relation to truck use of public highways. First, the truck has assumed a commanding position in the fast and fluid movement of package freight and other commodities. Our economic society has become dependent upon this form of transport and, without due recognition of this fact, a sharp decline in commodity fluidity could result that would curtail the extent and range of our national standard of living.

Second is the fact that the deterioration of highways themselves often (not always) is the result of poor highway planning in the early stages of motor travel history. Highways have come into their present phase of importance only in the past two decades and many of the roads now imperiled by heavy traffic have outlived their original specifications. Highways become tired with age, and surface rejuvenation does not replace the strength of the inner structure. Most highway systems, built in the thirties or earlier, require new study based upon scientific appraisal of the transport job needed.

Financing is a problem

It is true that few states can rebuild highway systems without some unusual provision for financing or refinancing. Even the basic rights-of-way need some revision due to scientific discoveries in regard to high speed automotive travel. Thus the usual cost of highway construction is amplified by the need for studies of traffic flow, load weights, congestion, and other items of a costly nature. This requires special financing that regular state tax funds cannot provide.

The result is that various states are experimenting with new techniques of fund raising to overcome this financial problem. One method is that of toll roads where the road itself pays for its construction. Superhighways of this type in the long run are cheap to construct for they cut down maintenance costs on old line highways and take advantage of the best scientific construction methods available. But they do require an initial indebtedness that is difficult for some states to assume. And so the tax is used by Ohio.

The great difficulty of the tax system for highway construction is the restricted operation that it can develop. In this respect a system such as has been devised by Ohio would make the use of motor trucks on highways of the state a luxury form of transportation. Instead of becoming an economical source of distribution for commodities enjoyed by society, only those items could be transported that would have an inherently high value. The many thousands of dollars invested in trucks, terminals, and equipment could be placed in jeopardy if the full play of the effect of this tax would be permitted.

A secondary problem, of course, is the possible (and probable) retaliatory action that might come from other states who find the cost of operation on Ohio roads a costly venture. For example, Kentucky trucks must pay the tax as well as Ohio vehicles if they propose to operate over the Ohio highway system. Why, then, should Kentucky not also impose the same restrictions along with Indiana, Michigan, Pennsylvania, etc.

Economic freedom basic

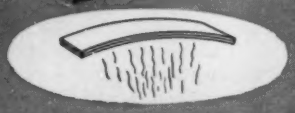
One of the fundamental premises of American political-economic philosophy is that freedom of operation should be achieved in all of our business operations. This freedom is not only applied to internal business operations and direct governmental intervention into the conduct of economic practice, but it is also applicable to the free flow of commerce between the states and across state boundary lines.

The well-being of the American people dictates that the movement of economic goods by truck, rail, air, pipeline, or waterway should be fostered rather than restricted. Before the era of the motor truck, people in rural and remote areas lived less up-to-date lives because many products were not available far from the economic style centers of the nation. Free transportation movements have changed all this.

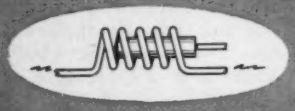
People should not be misled by the thought of an easy road to highway maintenance and new construction costs. There is no easy way—only one plan that will cost less than the other alternatives. The truck tax system is appealing, for it seems to put the cost burden on the highway user. It is insidious for it tends to lower the standard of living of each member of society by reducing the supply of goods available for distribution and by raising the retail price of the items we may purchase. Care must be exercised, then, that the easy way does not become too costly for the American economic system to endure.

Dr. Bunting, well-known southern economist, is president of Oglethorpe University, Oglethorpe, Ga.

ONLY BULLDOG DUO-GUARD PUSHMATICS PROVIDE DOUBLE PROTECTION



Simplified diagram of thermal element. Overloaded circuit heats bimetal, causing it to expand. Latch is released and pulled upwards by steel spring, breaking circuit.



Simplified diagram of magnetic element. High overloads or shorts set up magnetic field in coil. Magnetic field instantly activates metal plunger which releases latch. Spring pulls latch upward, instantly breaking the circuit.

Duo-Guard Pushmatic circuit breakers provide double protection because they use *separate* protection elements. Only BullDog Duo-Guards have both a thermal element and a wound-coil magnetic element.

The thermal element (bimetal strip) protects branch circuits from "normal" overloads, and guards against nuisance tripping. The magnetic element (wound coil solenoid) protects branch circuit wiring and insulation, and properly connected lamp and appliance cords, against damage from shorts and dangerous overloads of high intensity.

Add BullDog's exclusive push-button control to the Duo-Guard feature, and you have the world's most efficient circuit breaker. No other breaker—at any price—offers as much. Many cost more. Get complete details about the Duo-Guard Pushmatic—the standard BullDog breaker—and Electri-Center panelboards. Write, today, for free new Bulletin PM-365. BullDog Electric Products Company, Dept. ES-24, Detroit 32, Michigan.

©BEPCO

THOROUGHBRED IN ELECTRICAL EQUIPMENT

Extra protection at 20 amp.

The new 20-amp. Duo-Guard provides the same short-circuit protection as the 15-amp. Cords, lighting, appliances and branches get quicker acting protection from dangerous electrical faults. At the same time, the 20-amp. Duo-Guard carries its full-rated load and prevents nuisance tripping.

BULLDOG
ELECTRIC PRODUCTS COMPANY

CONSULT THE FOLLOWING SOUTHERN REPRESENTATIVES

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Atlanta, Georgia

Wilson Electrical Equipment & Company
2930 Commerce Street, P.O. Box 1725
Houston, Texas

101 E. Maple Street
San Antonio, Texas

Standard Electric Mfg. Co.
2401 Federal Street
Dallas 1, Texas

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

(Additional items will be found on pages 10 and 77)

1008—Electrical Equipment. The latest edition of the Federalog has just been issued by Federal Electric Products Co., 60 Paris St., Newark 5, N. J. This profusely illustrated catalog contains complete details of Federal's newest motor controls, safety switches, service equipment, circuit breakers, panelboards, switchboards, and busduct.

1030—Condensed Lighting Catalog. This 8-page descriptive bulletin issued by Pittsburgh Reflector Co., 450 Oliver Bldg., Pittsburgh 22, Pa., describes in detail the most popular items in the Pittsburgh line of fluorescent and incandescent lighting equipment. Each item is fully illustrated and cataloged, and many are accompanied by installation drawings.

1032—Receptacles, Plugs, and Connectors. Russell & Stoll Co., Inc., 125 Barclay St., N. Y., has released a bulletin No. EL-4-46, describing the new Ever-Lok receptacles, plugs and cord connections for 30 amperes, 440 volts, a-c. Typical uses are for heavy duty industrial purposes.

1048—Plug-In Strip. An illustrated catalog showing the complete "Plug-in" Strip line has recently been published by National Electric Products Corp., Pittsburgh, Pa. This 8-page illustrated brochure pictures the 3 ft. and 6 ft. standard lengths of the multi-outlet branch circuit assembly. Several pages are devoted to detailed instructions for cutting the "Plug-in" Strip on the job.

1054—Fluorescent Fixtures. Catalog No. 53 illustrates 74 pages of commercial and industrial designs. Featuring all types suitable for schools, industrial and commercial buildings, retail stores, etc. This catalog is available from the Kayline Co., 2480 E. 22nd St., Cleveland 15, Ohio.

1058—Conductor Fittings. A complete catalog, illustrated and listing prices, has been issued by Penn-Union Electric Corp., Erie, Pa. Described is the company's complete line, including a wide variety of service connectors, terminals, tees, and taps; also many other types of conductor fittings.

1076—Modular Lighting. A 20-page booklet containing interesting and useful information about the "modular system" of lighting can be obtained by writing to the Mitchell Manufacturing Co., 2525 Clybourn Ave., Chicago 14, Ill.

1082—Lighting Equipment. Preprints of The F. W. Wakefield Brass Co.'s eight-page section on lighting which will appear in the 1954 Sweet's Catalog are available on request to Wakefield, Vermilion, Ohio. Descriptions of eleven major types of lighting equipment are supplemented by structural drawings and illumination data, including quick computation formulas for the company's several types of translucent ceilings. Some facts on acoustical effectiveness of Wakefield baffles and use of plenums as air diffusers are included.

1086—Connectors and Couplings. Tomic Sales and Engineering Co., 4864 Woodward Ave., Detroit 1, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

1088—Fittings and Fixtures. A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg. Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1090—Midget-Size Busduct. Complete information on Power Plugin, the new, midget-size busduct, is found in bulletin No. 720, available from Frank Adam Electric Co., 3650 Windsor Pl., St. Louis 13, Mo.

1092—Electrical Boxes and Conduit Fittings. Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 12, Pa., offers a catalog of their complete line.

1110—Flexible Cords and Portable Cables. Bulletin H-451, a 55-page illustrated booklet describing Hazacord cords and cables, is being offered by Hazard Insulated Wire Works, Div. Okonite Co., Wilkes-Barre, Pa.

1130—Conduit Fittings. The latest completely illustrative catalog on their diversified line of conduit fittings is announced by The Atlantic Conduit Fittings Company, 589 Atlantic Avenue, Boston 10, Mass.

1136—Cavalier Heaters. A booklet is available from Cavalier Corp., Chattanooga, Tenn., describing the special features of the Cavalier Wall Insert Automatic Electric Heaters, and including specifications on the four models of the line. Cutaway views and photos illustrate exclusive features.

1144—Commercial and Industrial Lighting Fixture. Catalog available from Lithonia Lighting Products Company, Lithonia, Georgia. It contains descriptive litera-

ELECTRICAL SOUTH
806 Peachtree St., NE
Atlanta 5, Ga.

February, 1954

Gentlemen:

Please send me the bulletins and catalogs indicated

(Print Plainly)

Name ..... **Title** .....

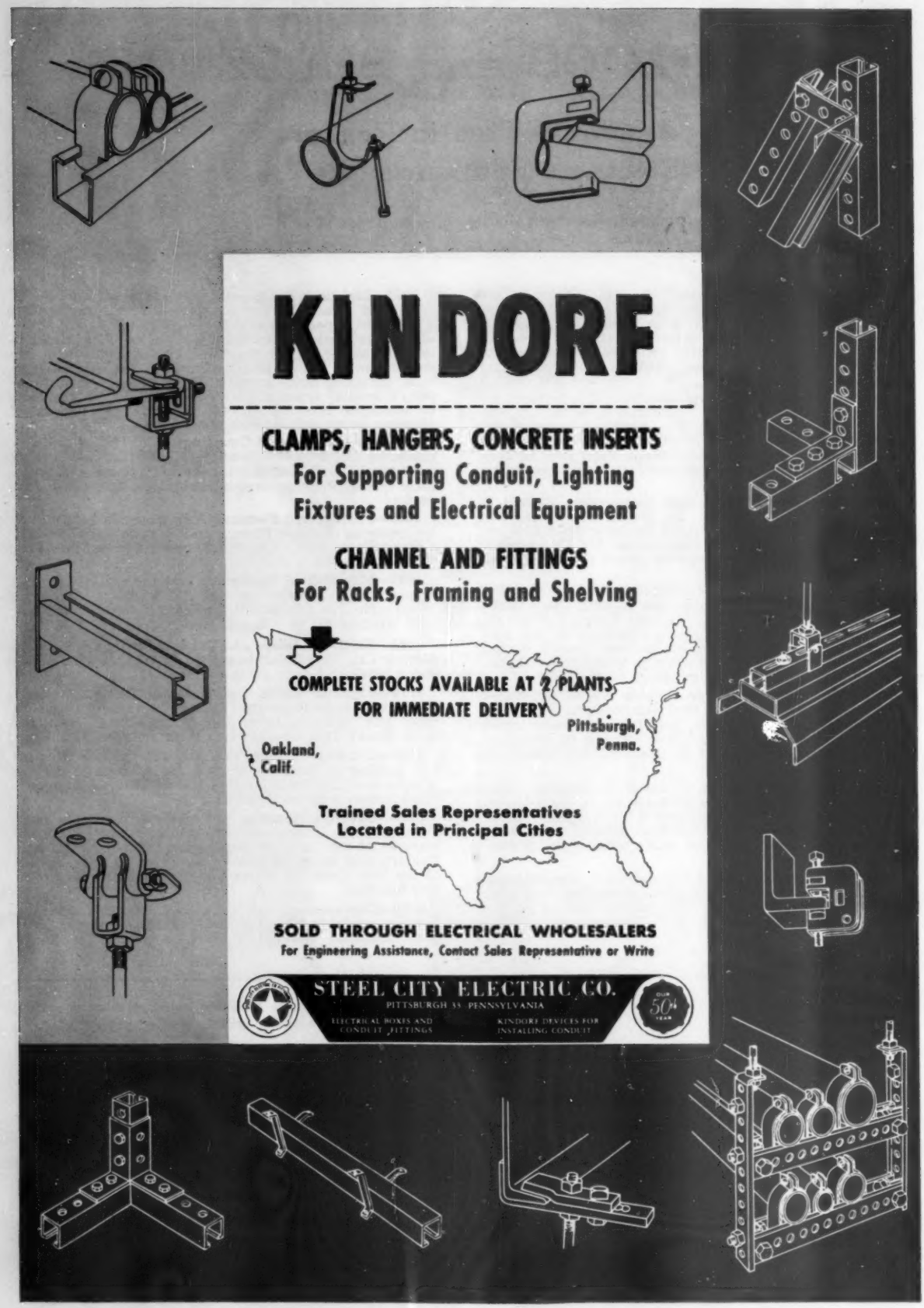
Company .....

Address .....

City & State .....

Circle numbers below. Bulletins and catalogs will be mailed promptly.

1008	1030	1032	1048	1054
1058	1076	1082	1086	1088
1090	1092	1110	1130	1136
1144	1150	1156	1166	1172
1178	1180	1182	1184	1186
1188	1190	1192	1198	1200
1202	1204	1206	1208	1214
1216	1218	1220	1222	1224
1226				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CLAMPS, HANGERS, CONCRETE INSERTS
For Supporting Conduit, Lighting
Fixtures and Electrical Equipment
CHANNEL AND FITTINGS
For Racks, Framing and Shelving
COMPLETE STOCKS AVAILABLE AT 2 PLANTS
FOR IMMEDIATE DELIVERY
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SOLD THROUGH ELECTRICAL WHOLESALERS
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STEEL CITY ELECTRIC CO.
PITTSBURGH 33 PENNSYLVANIA
ELECTRICAL BOXES AND CONDUIT FITTINGS
KINDORF DEVICES FOR INSTALLING CONDUIT
OUR 50th YEAR

FRIGID for '54 New!

PRESENTING THE *Capri*

WINDOW TYPE ROOM AIR CONDITIONERS

½, ¾ and 1 Ton units

Dramatically new!
Designed for year 'round comfort.

"COOLS! "HEATS!

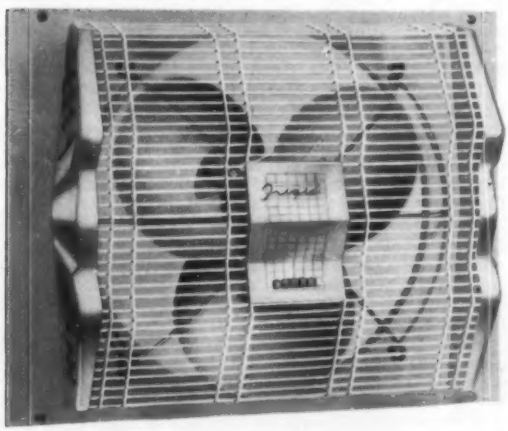
FRIGID offers this popular priced, profit making line with features demanded. Modern Styling; Dehumidifier; 2 Speed Da-Nite Cooling; Exhausts Stable Air . . . Intake fresh, cool outside air; Double Size Filter for greater health protection; U.L. and C.S.A. Approved; and a 5 Year Warranty.

A mere flick of the Frigidial for desired temperature

New! *that added boost to your profit!*

Electro-Control PUSH BUTTON WINDOW FANS

IT'S NEW! IT'S DIFFERENT!



Exclusive Push Bottom control . . . no more pulling or tugging . . . *just push buttons* for complete automatic control. Handsomely designed to harmonize with any decor . . . *Just push a button* for refreshing outdoor air to fill the room or for exhausting stale air. 6 quiet speeds . . . 3 Speeds Exhaust, 3 Speeds Intake. Fully guaranteed.

FRIGID means quality, styling and guaranteed performance . . . and priced right to give you more profits in '54.

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Jobbers:— Send for new 1954 Illustrated catalog

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ture, specification sheets and photo-metric data on complete line of fluorescent lighting equipment for commercial, industrial, school and other applications.

1150—Fluorescent Fixtures. Colorful, 20-page catalog. Front cover shows interesting illustration of "Light through the Ages." Catalog gives complete specifications and pictures of entire Naturlite line manufactured by Light & Power Utilities Corp., 1035 Firestone Blvd., Memphis, Tenn.

1156—Industrial Lighting. The new Abolite Catalog and Handbook contains a complete descriptive story of all commercial, industrial floodlighting equipment manufactured by the Jones Metal Products, Inc. of West Lafayette, Ohio. Several new sections have been added and all major lighting units have revised illustrations, cutaway views, dimensional drawings, plus typical installation diagrams and photos.

1166—Electrical Fittings. 40-page illustrated catalog and price list and wide Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and nonmetallic cable. Most of the line is made of tough malleable iron and hot dip galvanized. Desired copies available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1172—Bus Duct Manual. A new 68-page manual describing types of bus duct and accessories available, and presenting application and test data, specifications, information on pricing a typical bus duct installation, and a typical bill of materials, is available from Westinghouse Electric Corporation, Box 2099, Pittsburgh, Pa. The manual is designated as Bulletin No. B-4272A.

1178—Remote-Control Wiring System. Bulletin 16-200 is a 36-page manual describing layout and installation of remote-control wiring, and is available from General Electric Co., Construction Materials Dept., Bridgeport 2, Conn. Advantages and explanation of the system are followed by illustrated installation procedure. System components, circuit diagrams, and a typical home layout round out this completely descriptive manual.

1180—Fluorescent Lighting. 24-page catalog describing complete line of commercial, industrial strip and kitchen lighting units, shielded and open, showing installation and maintenance data and price lists. Available from Louisville Lamp Co., Louisville, Ky.

1182—Switch and Bus Insulators. A new bulletin giving specifications engineering data, contours, dimensions, etc. on its full line of Switch and Bus Insulators has been recently published by Victor Insulators, Inc. of Victor, N. Y. Write for Bulletin No. 5 or use reply coupon.

1184—Simplex Type RHW Wire. Bulletin No. 1018 describes first Underwriters' Approved Type RHW Wire. New insulation allows 18 to 52% more amperes per conductor, depending on the ambient temperature. Developed to meet the new National Electrical Code standards. Approved for general purpose wiring in either wet or dry locations at copper temperatures up to 167°F. (75°C.). Wire made in two styles. Simplex Wire and Cable Co., 79 Sidney St., Cambridge 39, Mass.

1186—Electric Heating File, offered by Electromode Corp., 45 Crouch St., Rochester 3, N. Y., is made up to suit individual requests for information on Electromode Heaters for domestic, industrial or farm use; or to contain material on the complete Electromode line if desired. Included are specification sheets, illustrations, installations, how to select the right capacity heater, how to figure heat loss, wiring diagrams, and price sheets.

1188—CSP Distribution Transformers. A 32-page, three-color catalog, "Transformers That Cut Distribution Costs," is now available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. The "how" and "why" of these transformers is presented in four divisions: performance, evidence, construction, and the products.

1190—Electrical Fittings and Fixtures. Blackhawk Industries, Dubuque, Iowa offer a new 2-color bulletin describing and illustrating B-I Electrical Fittings and Fixtures. Included are conduit and cable fittings, conduit and cable straps, staples, box supports, sill plates, locknuts and bushings, wire holders and yard lights.

1192—Wire Pulling Lubricant. Illustrated six page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Company, 3812 West 150th Street, Cleveland 11, Ohio.

1198—Wire Handling Devices. Clyde W. Lint, 2323 W. 18th St., Chicago 8, Ill., manufacturers of the Jiffy Line of wiring handling devices, has just issued a three-page catalog insert of descriptions and price schedules for the materials in the Jiffy Line. Included in the publication are meters, floor and counter stands, reels, and tables.

1200—Fluorescent Fixtures. Complete information on commercial fluorescent and incandescent lighting of all types, for offices, schools, libraries, etc., and all industrial locations available from Benjamin Electric Manufacturing Co. Leader Div., Northwest Highway, Des Plaines, Ill.

1202—Hazardous-Location Equipment. Bulletin 2660 contains up-to-date information (following 1953 Code revision) on why equipment for hazardous locations is designed and built as it is, and is available from Crouse-Hinds Co., Wolf & 7th, No., Syracuse 1, N. Y. A detailed treatment of Article 500 of the 1953 Code is found in Bulletin 2655, also available from Crouse-Hinds.

1204—Electrical Conduit Fittings, Conduit Nipples, Couplings, Elbows. Illustrated Catalog available upon request to Electrical Fittings Corp., Woodside, N. Y., or our nearest warehouse in your locality.

1206—Electrical Tape. Available in catalog sheet form are Haartz-Mason specifications for Paramount Friction Tape, Stronghold Rubber Tape, and the new Paraplastic Plastic Tape which effectively does the work of both rubber and friction tapes for faster and neater taping. Haartz-Mason, Inc., Watertown 72, Mass.

1208—Contemporary Lighting. Two brochures describing contemporary lighting fixtures for residential, commercial and display purposes. 4-46 Prescolite Surface Series and Portable Lamps, AIA 31-F-23 (S-3) gives information on available surface units and portable lamps; 4-47 Prescolite Recessed Series, AIA 31-F-23 (R-8) discusses recess fixtures, exit and aisle lights, and new frame which adapts fixtures for use where acoustical tile ceiling is specified. Sizes, types, framing-in details, illustrations. Prescolite Mfg. Corp., 2229 Fourth St., Berkeley 10, Calif.

1214—Wire, Fuses, Wiring Devices, General Catalog of Royal Electric Company, Inc., Pawtucket, R. I., covering flexible service and lamp cords, cord sets, extensions, trouble lights, wiring devices and decorative Christmas lighting is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1216—Metal Framing—New Pocket Catalog No. 800. Handy reference for the engineer, draftsman, or man on the job—84 pages of useful reference tables, ideas, photos, drawings and other data on how to mount, frame, hang and support all types of mechanical and electrical equipment with UNISTRUT All-Purpose Metal Framing. Unistrut Products, 1013 Washington Blvd., Chicago 7, Ill.

1218—Carbon Products. A 28 page catalog on Motor and Generator Brushes and carbon products telling how to order brushes, grade recommendations, characteristics and description of brush grades, and a complete review of types of shunts, brush connections, terminal and shunt location. Catalog No. 95 is available from the Helwig Company, 2536 North 30th Street, Milwaukee, Wis.

1220—Stadium Lighting. The Pyle-National Company, 1334 N. Kostner Ave., Chicago, Ill., announces the availability of a new 8 page bulletin, No. 605, on stadium lighting, describing in detail floodlighting of a typical outdoor athletic arena stressing the importance of using fully enclosed floodlights.

1222—Decorative Carbon Lamps. Nalco Candylbeme decorative carbon lamps are the subject of a new leaflet which is now available from North American Electric Lamp Co., 1014 Tyler St., St. Louis, Mo. Descriptions, specifications, and list prices are given for the lamps which are suitable for use in electric candle sticks, crystal table displays, funeral chapels, wall brackets, altar lights, candelabra, torchieres, menorahs, churches, and hotels.

1224—Electrical Equipment. The Wadsworth Electric Mfg. Co., Inc., Covington, Kentucky, has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches. Service Equipment Distribution Panels and "E-Z-RED" Circuit Breakers.

1226—"Concentrol" Motor Control Centers. Completely descriptive, illustrated Bulletin 400 of the Continental Electric Equipment Co., Box 1055, Cincinnati 1, Ohio, gives full information on modular standardized "Concentrol" motor control centers. This bulletin features helpful layout and specification data of interest to both electrical equipment planners and plant production men.

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Make ACCURATE Electrical Tapes your choice for easier taping and positive electrical and mechanical protection. Both friction and rubber, ACCURATE tapes are strong, pliable, easier working. These quality electrical tapes are non-raveling, tear off clean, pull tight and firm ... make neat, high efficiency wraps even over irregular surfaces.

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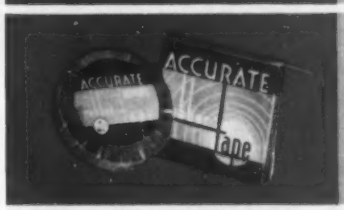

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Plug In Thermostats — type 205 for window air conditioners and portable electric heaters.

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STAB-LOK® CIRCUIT BREAKERS give you all the winning arguments when you talk with builders. First of all, it's been proved that modern circuit protection is a real sales feature with prospective home buyers, and Stab-lok provides this at almost no extra cost. In the next place, there's no question about Stab-lok dependability. More Stab-loks are sold today than all other circuit breakers combined . . . they're on the job in literally millions of homes.

In addition, only Stab-lok gives you these extra advantages:

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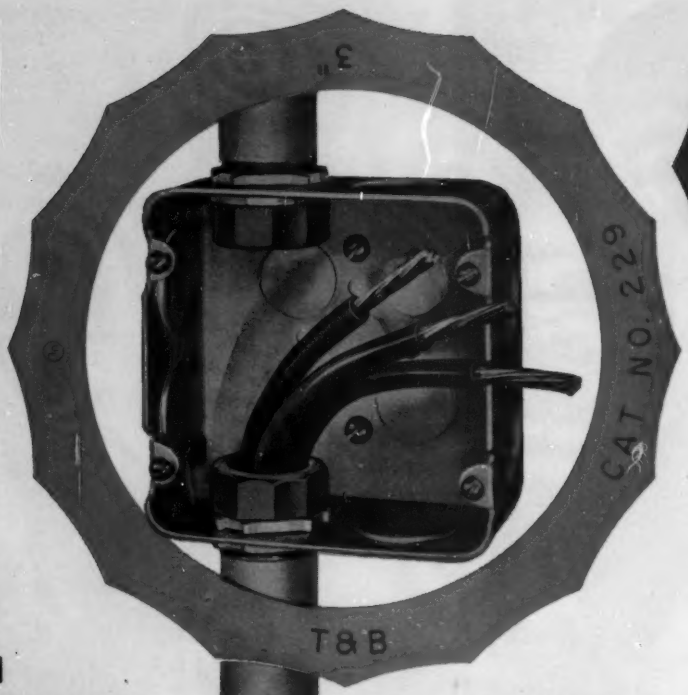

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These new T & B Insulating Bushings are designed to withstand rough treatment. Made of tough cellulose acetate butyrate, they're the toughest Insulating Bushings available today.

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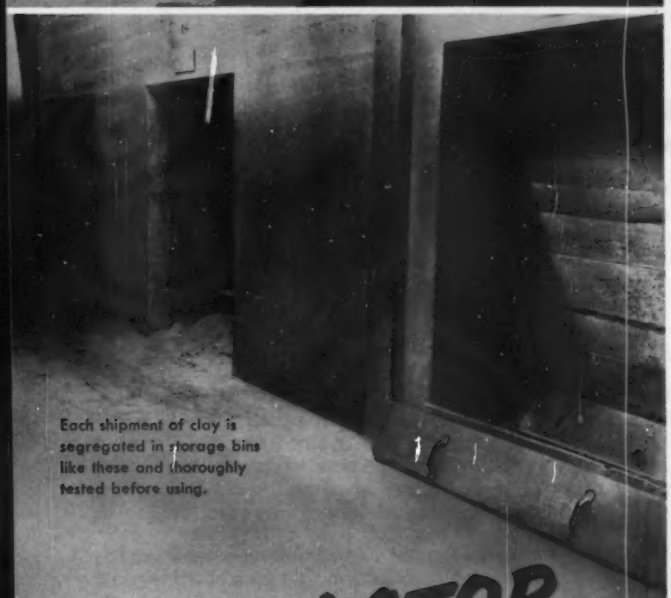

Each shipment of clay is segregated in storage bins like these and thoroughly tested before using.

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Get Network Advantages for Heavy Load Density Areas

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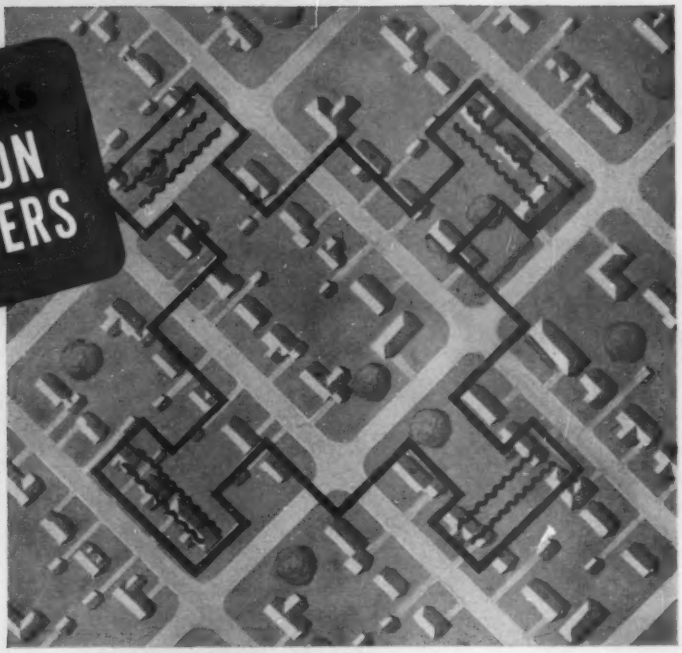

Get the complete story on the advantage of Banked Secondary Systems from your nearby Allis-Chalmers District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 61B8054.

ACPB TRANSFORMERS MAKE SECONDARY BANKING ECONOMICAL

You can distribute secondary loads and temporary overloads evenly and economically with ACPB distribution transformers. They permit bringing network advantages — improved service continuity, better voltage regulation, and less flicker from 120-volt starting loads — to heavy load density sections of urban and suburban areas. ACPB distribution transformers permit simplified paralleling of secondaries on systems fed by a common primary feeder.

Reduce total transformer capacity requirements. When ACPB transformers are distributing diversified loads efficiently, you can add capacity without increasing copper size. All you do is replace a transformer with one of a larger rating or add in another transformer of the same size to the circuit. Secondary fuses are completely eliminated.

ACPB transformers are supplied as a package that includes built-in lightning and system protection. To give short circuit and overload protection — plus a means of sectionalizing secondary faults — two internal low voltage breakers with separate external reset handles are provided. Two signal lights give visible warning of breaker operation. A-4218

ALLIS-CHALMERS

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You don't have to be armed to the teeth to avoid communications trouble. Not when your communications are supplied by the Bell System.

A planned program of preventive maintenance is an important part of Bell System service. Its purpose is to prevent interruptions in service.

In the laboratory, technicians are continually developing new and more efficient equipment. In the field, Long Lines plant and commercial experts frequently visit critical points of your communications system to observe conditions and to improve operations.

Alternate routings are an integral part of planning by telephone engineers to protect your service.

The entire program is backed by the Bell System's 78 years of communications experience.

We supply the power industry with reliable private-line telephone, mobile telephone and teletypewriter service, and channels for remote metering and supervisory control.

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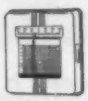

METERING CHANNELS

BELL TELEPHONE SYSTEM

Designing better lighting

Several drop fixtures added to the recessed lighting in a chain shoe store helped to create a homelike effect and break the flat ceiling.

Principal problem confronting lighting engineers in redecorating the new Kirsten shop were the angular lines and limited space. Adjustable fixtures helped to solve the problems.

◆ A PRIMARY CONSIDERATION in the design of a commercial lighting installation is the atmosphere to be created. This is dependent upon a number of factors, such as type of clientele, whether the store caters to men or women, merchandise displayed, location of store, amount of traffic, architectural design, arrangement of store fixtures, coloring, kind of stores in the immediate vicinity.

Each job is approached on an individual basis. We attempt to have each lighting fixture arrangment different from any previous installation, insofar as possible, so that each customer receives a custom-made result. One of the common pitfalls of an average installation is that of falling into a stereotyped pattern. By giving careful attention to each problem, devoting sufficient time to studying its needs economically and from a merchandising standpoint, we analyze and design each installation as an individual job.

The basic principles of lighting as well as design are followed. We combine fluorescent and incandescent equipment to produce desired effects.

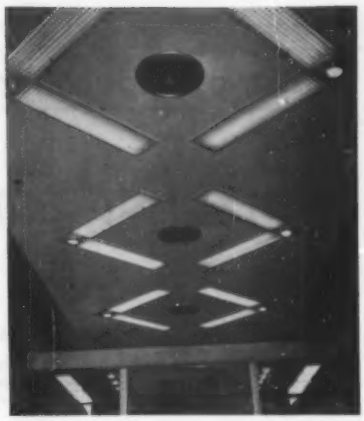
Use color effectively

Fluorescent light which produces predominantly whites and blues of the light spectrum, creating the effect of a cold atmosphere, and incandescent light which produces reds and yellows presenting an illusion of warmth, are combined according to the type of business and merchandise on sale. In certain cases, such as markets, drugstores, fur establishments, the predominance of fluorescent light is advantageous for the feeling of sterility it accomplishes, and particularly in fur stores where a cold atmosphere is conducive to sales.

In contrast to this, ladies' apparel and jewelry stores should

for merchandising

by Morton Silverberg
Engineer, Silverberg Electric Co.
Washington, D. C.



The cold atmosphere so conducive to sales in a fur store was created by using fuorescent light in broken square ceiling patterns.

have a predominance of incandescent to flatter both the customer and merchandise. In jewelry stores incandescent lighting produces sparkle and highlighting, necessary to the advantageous display of this product. In fact the greater the light intensity, the greater the eye appeal appears to be, but if heat becomes excessive, the oil in watches is affected and leather products dry out.

Good taste is basic

The principles of good taste are observed. Arrangement of lighting equipment should be as unobtrusive as possible. Stores are selling merchandise and not lighting equipment.

The principles of theatrics should be considered in dramatizing those features which it is desirable to emphasize and to deemphasize ugly mechanical equipment and pipes which cannot be concealed through other mediums. The use of color effects, contrasts between light and shadow, should be considered. In certain cases streaks of light on walls or panels, or in other cases, washing walls and ceilings with light are further tools which can be made available to produce unusual and pleasing over-all effects.

In common with many others, we are experiencing the reaction of merchants who are becoming more and more aware of the economical form of advertising that good lighting can be to increased sales. Merchants have come to recognize that building up higher intensities lowers sales resistance, and they are less reluctant to expend additional funds to obtain these results. In other words, money spent for an engineered lighting plan will be returned to them in the form of increased sales many times.

A current problem in building up higher intensities and the resultant damage to merchandise has led to attempt to sell merchants on the idea of mechanical ventilation in show windows. Exhaust fans taking off heat would pay off in reducing damage to merchandise and in increasing the life of bulbs, we point out to customers. A ventilation installation reduces maintenance costs.

Also, in show window lighting the trend appears to be toward increased flexibility of light control, in that it is desirable to have lighting follow change in window trim. When trims are changed, lighting should be adapted to highlight featured objects. Lights should follow trim, and not trim follow lights.

The lighting of fitting rooms in apparel shops and department stores should be carefully considered because a good deal of selling is done right in the fitting room. Inadequately lighted fitting rooms give rise to many complaints.

Another lighting result we try to achieve within a store is that of making people feel more at home, more relaxed, in order to create a closer personal relationship between customer and salesclerk. This is particularly desirable in the smaller town where personal relationships are more important. It is therefore vital that psychological reasoning should go into the lighting arrangement of a store.

A few examples of commercial lighting we have done in women's apparel shops, shoe stores, fur establishments will serve to illustrate points brought out in the article. In a ladies' apparel shop of odd, angular lines with limited space, we used in the main sales and show window area an adjustable light, recessed in the ceiling for greater flexibility in light control. We used an attractive dual purpose central fixture as a focal point to build light around the selling area. This dual purpose fixture lighted the ceiling and floor at the same time. Incandescent lighting was predominant because it lent itself to a warm atmosphere essential in a ladies' apparel shop. Fluorescent light was used in the display cases to give an effective supplementary touch.

This was a remodeling job which also required a changeover from d-c to a-c and finding the space to locate service equipment and still comply with the codes was a problem. We had to remove large abandoned d-c equipment, install a new mainline switch for the small stores in the building and reconnect three of the small meters behind the new mainline switch.

Creative talent needed

As another example, in a chain shoe store installation we developed a pattern of big squares of fluorescent light. We installed 18 four-foot square fixtures each with eight 40-watt tubes and plexiglass covers. Around them we placed a pattern of recessed highhats. This made an interesting arrangement and fitted the dimensions of the building very well.

We also installed three stem-drop fixtures to break up the flat ceiling appearance and to give a homelike effect to the whole. Since this was a suburban shop selling women's and children's shoes, the principles mentioned above, that of assisting personal relationships and creating an atmosphere of relaxation, were es-

(*Continued on page* 94)

Industrial application

Protecting motors against "single phasing"

by Ben R. Askew

Mgr., Industrial Power Division
Georgia Power Company
Atlanta, Georgia

◆ CUSTOMERS have often questioned the reliability of protection given by the standard full voltage motor starter against damage to a three phase motor from single phase operation. One supply line may be opened due to fuse blowing or other causes and the motor fail to start, or it may continue to run if already in operation, and the normal control equipment may not disconnect the motor. They have experienced trouble mainly with 220 volt motors of 15 horsepower and smaller.

A small freezer locker cold storage plant, operating with thermostatic control, may blow a fuse when trying to start during the night. The overload protection then must be relied on to disconnect the motor from single phase before its windings are damaged, or the customer is greeted in the morning with a damaged motor and the need for a replacement until it is repaired.

This is more apt to occur when the motor has been stopped for ten or fifteen minutes, the control protective heaters have cooled, and the imbedded motor windings are still hot. When the motor tries to start under these conditions with single phase, the control often will not keep up with the heating of the motor windings.

An air conditioning system where a motor is operated at its 55° C rise rating, and forced cooled, will be recognized as another ever present example. Unattended automatic sewage and water pumps, boiler feed pumps, and reversing motor drives for fans on dry kilns are other installations often affected. In the case of the dry kiln, the motor may be located in a warm place which has a different temperature from the location of the control; then it is reversed at specified intervals which may be a partial "plugging" action with its extra high current inrush. This sequence results in little coordination between the control and the motor, and often a damaged motor when operating with single phase.

Any damage which results generally costs both money and loss of time while locating and changing to another motor. The time lost may often be of more value than the repair of the motor. A damaged boiler feed pump can cause shutdown of all heat processes in an entire plant.

This question of protection against single phase operation has been discussed with the various manufacturers of control equipment, and the following summary incorporates their comments, and will help explain the problem and means for meeting it.

Conventional motor starters

The standard full voltage starting switches used on the motors of 15 horsepower and less are generally referred to as magnetic starting contactors. The connection diagram of a typical contactor of this type is shown in Figure 1.

From the standpoint of single phase protection, the holding coil and its connections, and the overload protection are the principal features involved. When the contactor is closed, the contacts themselves are held together in the closed position by an electro-magnetic coil which is connected to two of the main supply lines.

The overload protection is noted on the diagram as OL. It consists of heater coils connected in two or three of the lines leading to the motor. The heaters are designed to increase in heat with the same characteristics as the motor windings. Mounted adjacent to these

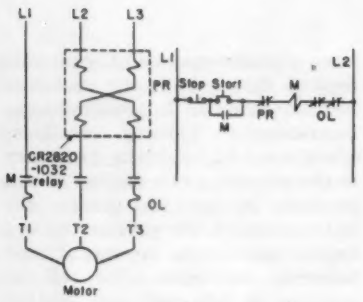


Fig. 1. Schematic wiring diagram of a typical magnetic contactor.

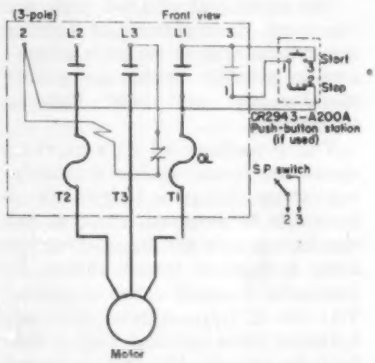


Fig. 2. Schematic wiring diagram of an open or reverse phase relay.

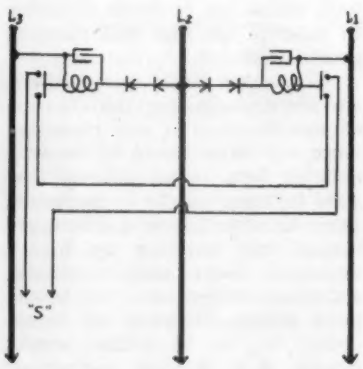


Fig. 3. This scheme uses voltage relays and will stop motor when voltage drops below 200 on one phase. Leads "S" are connected in stop button circuit of contactor.

heaters are bimetal or thermostatic strips which become distorted when heated. As the load on the motor increases, the current increases and so does the heat from the heaters; this in turn causes the thermostatic strips to become distorted to such a point as to open the circuit energizing the magnetic holding coil, and the contactor then opens.

The heaters are rated according to amperes, and in steps of a fraction of an ampere for the smaller motors, to steps of near one ampere for motors larger than 5 horsepower. They are supposed to be selected with due regard to the surrounding temperature conditions, type of duty on the motor, type of load, and the other features which affect coordination of temperatures of two pieces of electrical equipment with their operating conditions. Difficulty has been found in maintaining the necessary coordination under varying load and surrounding conditions, and at the same time give protection against single phase operation. It should be borne in mind that many of the installations to be protected are in small plants where there is no regular technical attendant.

In the example of the reversing fans on dry kilns, the heaters need to be large enough to stand the partial plugging condition, and at the same time be small enough to disconnect the motor when the current in two lines increases due to single phase operation.

The refrigerating equipment mentioned offers another instance of trouble in trying to depend on the heaters to disconnect the motor. The thermostat recloses the contactor, the compressor tries to start under pressure; and when a fuse has opened one line, the motor will not start, and a heating race begins between the relatively cool heaters and the still heated motor windings, with the motor windings often losing the race.

Ideal protector

These illustrations show some of the difficulties encountered when depending on the overload heaters to clear the motor when single phase is supplied. Proper control to take care of three phase motors under single phase operation must meet the following situations when one circuit is opened:

(1) Should open the supply circuit when the contactor is closed by the magnetic coil receiving full voltage when connected to the two remaining live wires. This operation to function under both starting and running conditions.

(2) Should open the supply circuit when the contactor magnetic coil is connected to one of the lines that opens.

(3) With a motor starting, the induced voltage between the open line and the other two will be near half the full line voltage, and generally the contactor will not close if one of the holding coil connections is attached to the line that is open.

(4) With a motor running, the regenerated voltage between the open line and either of the other two may be as high as 180 volts when 220 volts is supplied. This voltage depends on the load on the motor, and in one test with 208 volts as the supply, the regenerated voltage from a 5 horsepower motor carrying half load was 156. This will hold many contactors closed when a line is opened while supplying a running motor, though the holding coil is connected to the opened line.

(5) Whatever protection is added against single phasing, should not cost more than rewinding the motor, and preferably should have some method of indicating the motor has been disconnected due to single phase supply.

(6) It should be relatively simple.

To meet these conditions, four general methods have been used.

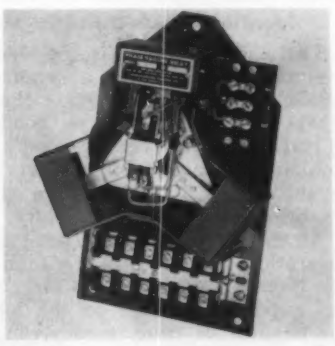
Perhaps the oldest and considered first, is the common current coil, plunger type instantaneous magnetic relay. This is made in sizes up to 600 amperes. When mounted in a standard Type 1 enclosure, it retails to an industrial customer for $60 to $68, depending on the current rating. The relay contacts are connected in the contactor holding coil circuit, and open this circuit on over current.

For the larger size motors, the current settings can be adjusted so as to operate when the current increases due to one of the three phase lines being opened. For motors of 15 horsepower or less, the cost and difficulty in adjusting for the low currents has been a hindrance to the use in this application. When used in dusty or oily locations, the plungers and cylinders in which they operate need to be kept clean so the plunger will operate freely.

Reverse phase relay

Another type protector for this use is known as an "open or reverse phase relay." Figure 2 shows a picture and connection diagram

(*Continued on page* 92)



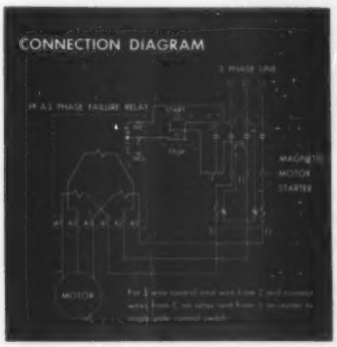


Fig. 4. Tests have shown that a high degree of protection for three phase motors against single phase operation is provided by this Phase Failure Relay. It depends for its operation upon an unbalance in current rather than voltage and has other advantages. (Photos courtesy Consolidated Electric Co., St. Paul, Minn.)

A 45-degree bend is made in one single setting of the bender. No moving of the pipe is necessary.

The bending shoe and the pipe fasten to the frame. The pipe has been pushed out of shoe with push-out pin.

Substantial savings

(Southern electrical contractors will be interested in these comments by a Chicago contractor on the savings to be made through the use of a conduit bender in comparison with use of elbows and couplings. He includes actual cost data in detail so that the comparison can be made by substituting your own local hourly labor rates. —Editor)

◆ WHAT DO SO MANY electrical contractors have against saving time, money and materials? As silly as that question may sound at first thought, looking at the facts from an objective viewpoint would seem to indicate that quite a few have objections to such savings. I'm referring to those contractors who still persist in working rigid conduit with 90-degree elbows and couplings, an expensive way of doing it when a rigid conduit bender can cut the time on the job by better than one-third and save countless hours for the next one.

The question is, why do the majority of contractors continue to use the expensive 90 degree elbows and couplings? Quite possibly it's because for years they had to put up with inefficient equipment that called for entirely too much calculation and considerable guess work. The use of highly skilled workers was necessary to get the bends made and the benders employed required resetting the conduit precisely to get uniform bends. Under such circumstance it's more economical to buy and use 90-degree elbows and couplings and resort to conduit benders only when it's unavoidable.

Identical bends possible

These disadvantages have been overcome, though, by a conduit bender on the market today that makes identical 90-degree bends in just one setting. The easy operation and elimination of guess work let the ordinary workman turn out uniform bends without difficulty.

All this I've just said is not just theoretical talk. My firm, the Johnson Electric Company, of Chicago, has experienced right on the job the savings of time, money, and materials that can be had by using the correct conduit bender.

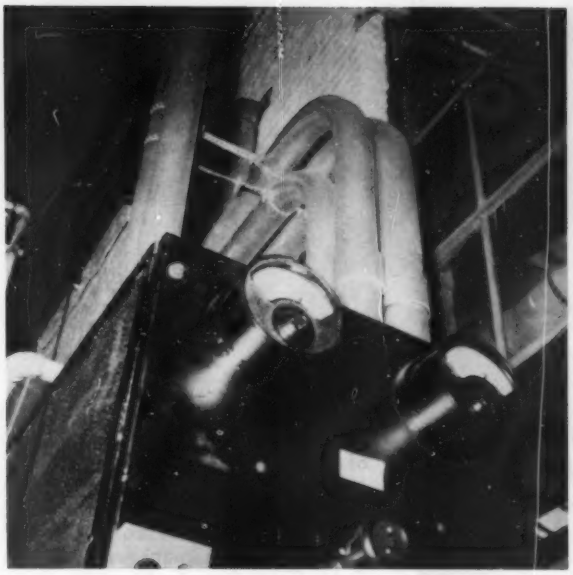
As an example, we did the work on the installation of an air compressor of 250 hp, three phase, working on 220 volts. It was put in the shop of the Diamond T Motor Car Company, in Chicago, Ill.

When we were awarded the bid for the conduit work valued at $665.00, we decided to use a Tal 4-inch one-setting rigid conduit bender, much to our later satisfaction. With it we made 90-degree bends without the least bit of difficulty, and what's more, all of them came out identical and exact, thanks to the fact that we didn't have to move the conduit but made the bends in one setting. The accurate indicator told us just how far to bend for the correct degree.

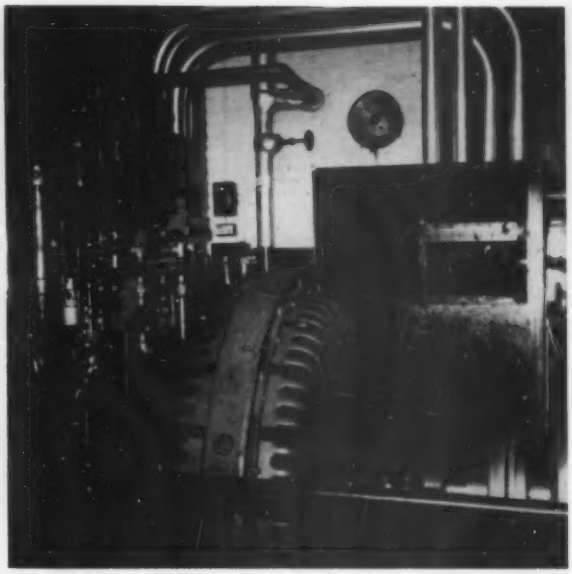
Actual cost comparison

Altogether 85 feet of 3-inch rigid conduit were used, which we figured would take us 59 hours to complete installed with hangers. This was estimated as the time needed for joining it with elbows and couplings. The actual time it required was only 39 hours installed with hangers, which means we saved better than one-third in time alone by our decision to use a rigid conduit bender.

During the work we made 14 bends, which would otherwise have



The sweeping curves of these bends in 3-inch conduit illustrate the good appearance of this method.



Cable pulling in conduit of larger sizes is easier with smooth bends made directly in the conduit itself.

with a conduit bender

by R. T. French
Superintendent and Chief Engineer
Johnson Electric Company
Chicago, Illinois

required 14 couplings, 14 elbows and 2 Erickson couplings. Figuring the saving in materials, this comes to $64. The 3-inch couplings cost 91 cents each, or $12.74; the 14 3-inch elbows ran to $4.37 each, or $61.18; and, the 2 Erickson couplings would have cost us $22.80 at $11.40 each. Actually the total of these comes to more than $64.00, but we allowed for the added conduit to make the bends. Each bend required 33 inches. Multiply this by 14 bends and we have 38½ feet. At 85 cents a foot, the total is only $32.72, which subtracted from the $96.72 total for the elbows and couplings gives us the $64 saved in materials.

Add to this 20 hours of labor at $3.50 an hour and the entire amount we saved was $134.

You needn't stop counting the advantages there, however. Bending elbows in full lengths of conduit eliminates the pieced together look you otherwise have with elbows and couplings as the appearance is smooth and straight without an apparent break. And when you go to pull cable through, you'll find it doesn't hit any obstruction.

With regard to the actual bending, any worker can be taught the proper procedure in just a few minutes. The 4-inch rigid conduit bender we used was operated manually and consists of a small hydraulic ram built into a light framework. This framework has adjustable corner formers to accommodate various sizes of conduit and to afford a selection of radii for bends. An assortment of half circle forming shoes is provided to fit each size conduit. The whole unit is small and easily transporated from job to job.

Bender operation simple

The operation of these units is fast, effortless, and simple. The conduit is placed betwen the forming shoe and the corner formers, the operating handle of the hydraulic ram is stroked, and the most stubborn conduit yields. When the proper degree of bend has been made, as shown by the indicator, the release handle causes the ram to return to its original position, ready for the next bend.

It's as simple as that, and the results will make you decide on conduit benders not only for offsets and long sweeps, but also for standard 90-degree elbows for all your jobs. Then you, too, will start experiencing the satisfaction of completing an installation with a minimum of work and materials that will show a handsome saving.

With only two main parts, assembly of the bender involves an extremely simple operation of these units.

SEWA

Panel No. 1—left to right, Glenn E. Ralston, vice-president and director of sales, Rome Cable Corp., Rome, N. Y.; John W. Shealy, Shealy Electrical Wholesalers, Inc., Greenville, S. C.; and R. G. Bellezza, vice-president and sales manager, General Cable Corp., New York.

Panel No. 2—left to right, L. C. Smith, manager, Wiring Device Division, Arrow-Hart and Hegeman Electric Co., Hartford, Conn.; R. G. Morris, Morris Electric Supply Corp., Savannah, Ga.; and J. C. Hicks, sales manager, Harvey Hubbell Inc., Bridgeport, Conn.

Panel No. 3—left to right, A. A. Snowball, vice-president in charge of sales, Pittsburg Standard Conduit Co., Pittsburg; Lew W. Hill, Hill-Soberg Co., Inc., Mobile, Ala.; R. G. Eck, sales manager, All-Steel Equipment, Inc., Aurora, Ill.; and J. C. Grindell, sales manager, Killark Electric Manufacturing Co., St. Louis.

Panel No. 4—left to right, Norman H. Vacha, vice-president, John C. Virden Co., Cleveland, Ohio; T. W. Wells, Jr., Wells Electric Supply Co., Birmingham; C. A. Burton, general sales manager, Sylvania Electric Products, Inc., Salem, Mass.; and Fred Guth, vice-president, the Edwin F. Guth Co., St. Louis.

Panel No. 5—left to right, Perry M. Green, vice-president and sales manager, Continental Electric Equipment Co., Cincinnati; J. B. Carson, Kingsport Electric Co., Kingsport, Tenn.; L. C. Watson, manager, distributor sales, Allen-Bradley Co., Milwaukee; and M. P. Kartalia, manager, merchandise sales, Square D Co., Detroit.

Industry Day Forum

◆ THE FIRST SESSION of SEWA's Fourth Annual Industry Day Meeting was opened by President W. H. Butt, who addressed the group briefly. He reminded the members that during many of the years just past electrical wholesalers were beset by many restrictions and controls. Now they are free of all those and can again face the problems that mainly confront them—the problem of selling that involves customers and competitors.

Wire and cable

The meeting was then opened for panel discussions. The first panel was to cover the subject of wire and cable. The panel was presided over by John W. Shealy, Shealy Electrical Wholesalers, Inc., Greenville, S. C.; and his panel consisted of R. G. Bellezza, vice-president and sales manager, General Cable Corp., New York; and Glenn E. Ralston, vice-president and director of sales, Rome Cable Corp., Rome, N. Y.

Mr. Bellezza explained that nearly all cable manufacturers are now members of NEMA and considerable work is going on in the field of standardization, both with respect to wire and cable products and packaging. NEMA has realized the need for widespread publicity for adequate wiring promotion.

Mr. Ralston explained that for the last eight or nine years with the exception of one brief period we have experienced shortage of materials—especially copper. Now that seems to be over and materials are plentiful and also wire production capacity is greatly increased. All predictions point to a very healthy growth in the next few years. But the situation immediately ahead is one that presents a need for real salesmanship.

In answer to the question as to whether there were any standards as to packaging, Mr. Bellezza pointed out that at present there is no uniformity but that the NEMA committee will be getting into that soon. He pointed out that most manufacturers are now using cartons instead of coils for sizes up to No. 6.

One question was raised as to whether uniformity could be followed as to color labels on cartons. The questioner wanted different types like TW, etc., to have uniform labels. Mr. Bellezza reported that this would come in some form through the NEMA committee.

Another questioner asked if there couldn't be uniformity in USE cable—the USE cable of various manufacturers vary in weight and dimensions. Some contractors find that they can't use some waterproof entrance fittings with all makes of cables. Mr. Bellezza again mentioned that standards have not been maintained. Mr. Ralston brought out that some ten years ago all USE cables were made according to standards which were coordinated with the fittings available. But improvements in insulations, etc., have taken place, and some sizes have been changed.

On the question of reel credits, Mr. Bellezza pointed out that his company and most others would allow credit if reels were returned within one year. Mr. Ralston pointed out that published policies were more or less uniform, but the administration of those policies varied considerably.

Another member raised the question as to whether there were any trends toward more cable and wire manufacturers selling their products through agents directly to the electrical contractor.

Mr. Ralston answered by saying that most companies felt that the distributor was the proper channel for distribution, but he said that some makers of limited lines had to sell direct because they cannot interest wholesalers in a limited line.

One wholesaler raised the question as to why paper insulated cable is sold direct. Mr. Bellezza explained that at the present time paper cable is all made to special order. Since they are not items that can be stocked and serviced by wholesalers, and since they are not merchandisable items, the manufacturers have arrived at this policy of selling direct.

Wiring devices

The panel on wiring devices next took their places on the platform. Chairman of the panel was R. G. Morris, of Morris Electric Supply Corp., Savannah, Ga. With Mr. Morris were L. C. Smith, manager of the Wiring Devices Division of Arrow-Hart and Hegeman Electric Co.; and J. C. Hicks, sales manager, Harvey Hubbell, Inc.

Mr. Smith made the point that the real market ahead lies in rewiring, and that only one home in 2,000 is adequately wired. The air conditioner has brought this problem into focus particularly. 1954 is going to be a good year in this field, but everyone is going to have to get out and fight for the orders.

Mr. Hicks said that the over-all industry picture for the wiring device business is going to be about ten per cent better than 1953 and that year was an improvement over 1952.

Statistics show that for every $1,000 worth of new construction, about $3 is spent on wiring devices. New construction in 1953 went to about 30 billion dollars so one can see what a sizable business this is.

The question was asked if ivory wiring devices could not be put out at the same price as the brown items. Mr. Hicks said that sales were about three to one in favor of brown and also that materials for ivory cost more than those for brown.

Comment from the floor, how-

(*Continued on page* 85)

This unit of the Standardizing Laboratory of the Dallas Power and Light Company is divided into three sections. Field standards are checked at left, the center section contains standard indicating instruments, and a section for the potentiometers is located at right.

C. W. Carter, service foreman, receives message by short wave radio.

New meter test room of Dallas Power and Light Company.

All meters returned from service are processed in the meter repair room.

DP&L

◆ SOMETHING NEW in the development of equipment required by the meter division of a utility is the meter test board that has been shop-built by the Dallas Power and Light Co.—and at a saving of approximately $800 over normal anticipated cost.

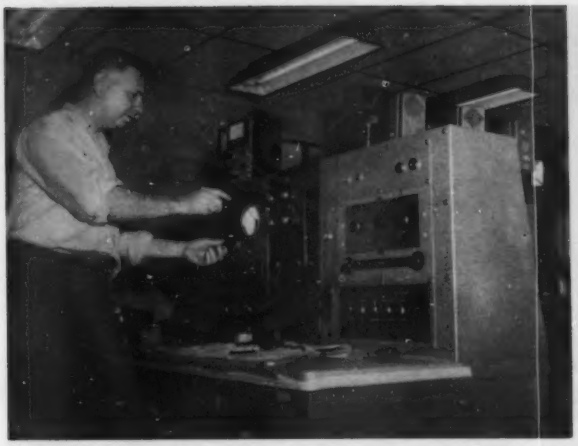
The new board gives the company a battery of five completely modern test boards, three of which feature the Knopp uniload set, and the new set replaced the last of the company test boards that featured rows of manual, old-type switches.

V. P. Armour, head of the company's meter division, explains that although economy was one of the objectives in the shop-built test board, it was not the only motive.

"The experience to be gained by members of our staff during construction of the board was considered an element of considerable value," he said. "We concluded that if staff members participated in the project and watched its development as it progressed, their abilities would be materially enhanced.

"Naturally, economy was a factor in our decision since our estimates indicated a substantial saving.

"The Knopp uniload set, of



C. G. Meyer, laboratory tester, makes minor adjustments on the shop-built test board, part of the modernization.

V. P. Armour, left, meter division head, and M. B. Donegan, laboratory supervisor, are shown in the DPandL lab.

modernizes meter laboratories

by Baron Creager

course, came complete from the factory. Otherwise, we added essential parts obtained from manufacturers and bought a manufactured desk that seemed to be best suited to our purpose. The rest was a matter of design, fabrication and detailed mechanics."

Mr. Armour indicated a belief that by the time the company needs another test board, further economies might be realized from experience gained in production of the first shop-built board. But since test boards are added only as demanded by division growth, there is not likely to be a repeat project in the near future. Addition of the shop-built board provides for needs of the company for some years to come, it is estimated.

However, rapid Dallas growth forced recent expansion and modernization of the meter division quarters, an illustration of this growth being the fact that meters in service have increased approximately 7,000 in the past twelve months. However, approximately 9,000 meters were replaced during the same period of time because of customers' rewiring due to remodeling, adding loads and changing class of service.

As in the meter division of almost any utility, the DP&L division function follows a pattern—installation of service from line to customer, installation of meters, maintenance, service connections, disconnections, replacements — the functions of providing and maintaining electric service. Therefore, the life of a meter division involves endless installing, repairing, testing and more testing.

In its test room the company tests new meters as they arrive except "factory certified" meters which are only "sample tested."

Also tested here are meters removed from service for periodic tests as well as any meter out of service for any reason whatsoever. Only "request" and large power meter tests are made in the field. In all, nearly 20,000 meters were tested during the past year.

These checks for accuracy go on constantly at the test boards which, in turn, are periodically checked in the standardizing laboratory.

Here in the laboratory is the ultimate in equipment for measuring the accuracy of precision instruments that measure the flow of electrical energy. In this laboratory all portable electrical testing equipment used by the various departments and divisions of the company are maintained and tested.

The basic unit of accuracy is the standard cell, each of four of these making periodic trips to the National Bureau of Standards for check against the best known standards of accuracy. As each standard cell returns from the Bureau of Standards, it becomes "Number 1," or reference cell.

Here Naval observatory time from Arlington, Virginia, and the "standard cell," provide the nearest approach to utter accuracy. The standard time clock is checked daily from the Naval observatory and is maintained within one second variation per day. Also, the clock is equipped with contacts for timing the watts applied to a meter or standard under test. This gives the watthour base.

Power source to the laboratory is provided by a generator, housed in an almost completely soundproof room adjoining the standardizing laboratory.

From this atmosphere of laboratory precision and accuracy, functions of this or any meter division range to the more rugged aspects of meter service and involve, of course, the transportation fleet and field crews.

In this activity perhaps DP&L is in the forefront of progress, with 23 trucks and three passenger cars,

(*Continued on page* 92)

Speculative builders have been quick to recognize the selling advantages of heat pumps. The first two of 14 houses built at Coral Gables, Fla., were sold for cash before completion. Lowry Electric installed the equipment.

Builders welcome

Enthusiasm among builders in the mild Florida region for the newly developed heat pump is pointing toward a new "way of life" in year-round air conditioning. They're calling it "something the public has wanted for a long time," and they're selling "like hot cakes."

◆ A SPECULATIVE home builder in St. Petersburg, Fla., was persuaded by Guy C. Hall, supervisor of the air conditioning department of the Florida Power Corp. and W. W. McMillan, Florida representative of an air conditioning manufacturer, to build a house with a heat pump installation.

The builder, Bruce Wiesemann, experimented with a small home of about 1000 sq. ft., in which a 2 hp unit and duct work were incorporated in the architect's design.

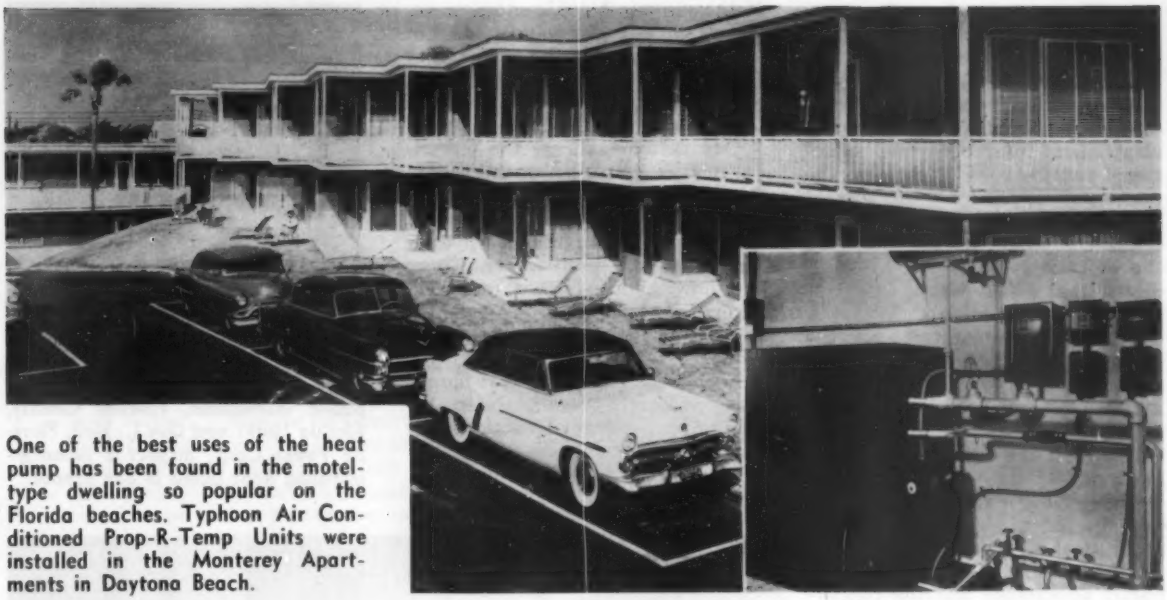
Weisemann spent about $200 in advertising and sold five houses from the one plan. Then he built five more houses, from which he sold fourteen. Eventually he sold twenty-five houses, all equipped for both heating and summer cooling.

By this time he had become so enthusiastic over the future possibilities of heat pumps that he acquired a subagency in the Tampa Bay area for a well-known line.

Heat pumps have not developed overnight, but this has been their biggest year so far. W. M. McMillan of Jacksonville, who has been in the business only six years with many discouragements, is one of the pioneers in merchandising the product in the South. He says the heat pump is something that the public has wanted for a long time without realizing it and predicts a "terrific" development in markets during the next ten years.

The most authentic figures on heat pump installations in the United States are those published by the Joint Heat Pump Committee of the Association of Edison Illuminating Companies and the Edison Electric Institute. As of last March, when the latest official report was issued, there had been a total of only 1054, but trade sources believe that as many have been sold in 1953 as in all previous years together. One company which recently placed a package unit on the market sold 100 within a few months in Florida and south Georgia alone.

While with some modifications the heat pump is said to perform well in any climate, its greatest acceptance has been in areas with a mild winter climate where the cooling load is greater than the heating load. Thus, regardless of population, Florida led the country in the number of installations up



One of the best uses of the heat pump has been found in the motel-type dwelling so popular on the Florida beaches. Typhoon Air Conditioned Prop-R-Temp Units were installed in the Monterey Apartments in Daytona Beach.

the heat pump

by C. E. Wright

to last March, with a total of 281. California was second with 174. Texas had 66, Oregon 64, Washington 56. The Southern states next in line to Florida and Texas were Georgia with 48, Tennessee with 40, Virginia 31 and Louisiana and Alabama, each with 27. The only Northern states approaching these figures were Ohio with 37 and Indiana with 30. Some of the most populous states are far behind. New York, for example, had only six and Pennsylvania only four.

The two areas in Florida which have contributed most to the state total are the Tampa Bay and Jacksonville areas. Miami, which is usually a good market for new things, has been less receptive probably because of the extensive advertising of oil heaters by the Florida Power & Light Co., which has been apprehensive of an overloading of its power facilities during winter cold snaps. But heat pumps are being actively promoted in the Miami area. One contractor-retailer company active in their promotion is Lowry Electric Company of Coral Gables.

In St. Petersburg and, in fact, throughout all of its territory, the Florida Power Corporation has taken the position that a more extensive use of heat pumps would balance its summer and winter load. Its air conditioning department, headed by Guy C. Hall, was one of the first in the country sponsored by a public utility. Mr. Hall is a member of the Joint AEIC-EEI Heat Pump Committee and of the advisory heat pump committee of the American Society of Heating and Ventilating Engineers.

Much of the impetus in the development of markets for heat pumps has come from the power companies. The chairman of the AEIC-EEI committee is E. R. Ambrose of the American Gas and Electric Service Corp. Southern members, in addition to Mr. Hall, are C. W. Hamilton of the Georgia Power Co. and C. F. Lane of the Virginia Electric & Power Co. Although not a member of the committee, C. W. Cheatham, air conditioning engineer of Alabama Power Co., is active in promotion of heat pumps. Such outstanding companies as Consolidated Edison of New York, Boston Edison, Detroit Edison, Philadelphia Electric and others are represented.

Florida Power does not, of course, sell heat pumps, but it cooperates with contractors and retailers who are engaged in the business. It also aids the manufacturers by trying out every heat pump that comes on the market by installing it in a home and reporting to the manufacturer a record of its performance, pointing out deficiencies, if any. It possibly deserves a good deal of the credit for the largest heat pump installation in the United States in seven grade schools and four high schools of Pinellas County, Florida.

Some of these jobs had been completed in time for a full winter's school term. Not only was there a saving in costs as compared with fuel oil, but colds and absenteeism among students and teachers were less than in oil-heated schools.

"It was a big job to sell heat pumps to the school board, the citizens committee, the taxpayers committee and others," said Mr. Hall, "but the results of the first installations were so satisfactory that on the last four schools bids were not invited from competitive types of heating." In most of the schools cooling was not provided for classrooms, but only for public

assembly rooms such as the gymnasium, auditorium, cafeteria and administration offices.

Although such large installations require the services of air conditioning specialists who employ electricians, plumbers and sometimes refrigeration engineers, the package units now on the market are easily installed by the electrical contractor or retailer, with the help of a plumber. It is predicted that expansion of markets may be greatest where well water can be easily obtained, but the air-water units being marketed by some of the larger companies now in the field can draw their water supply from city mains.

Most of the initial promotion work on heat pumps has been done by manufacturers or their agents and electric power companies. A great deal of educational spadework has had to be done to obtain public acceptance and the concurrence of architects and builders. W. W. McMillan of Jacksonville, for example, has conducted a television program to which architects and builders have been invited to show their plans. During these programs Mr. McMillan has worked in a discussion of heat pumps, but the principal theme of the telecasts has been to show the public the newest ideas in home design.

While the program has been primarily educational to ascertain what the public wants, it is noteworthy that a discussion of the heat pump system of heating and cooling has brought many more telephone inquiries than a showing of the older conventional heating methods. The appreciation of the architects for this educational program was recently shown when Harry F. Burns, secretary of the North Florida chapter of the American Institute of Architects presented Mr. McMillan with a plaque on one of his TV programs.

One of the factors that is said to have held back a more rapid development of the heat pump market is the difficulty of finding well qualified local representatives. The heat pump is said to be a "natural" for the electrical contractor or retailer, but there has possibly been a reluctance on the part of some to undertake a new line on which a good deal of pioneering missionary work would have to be done.

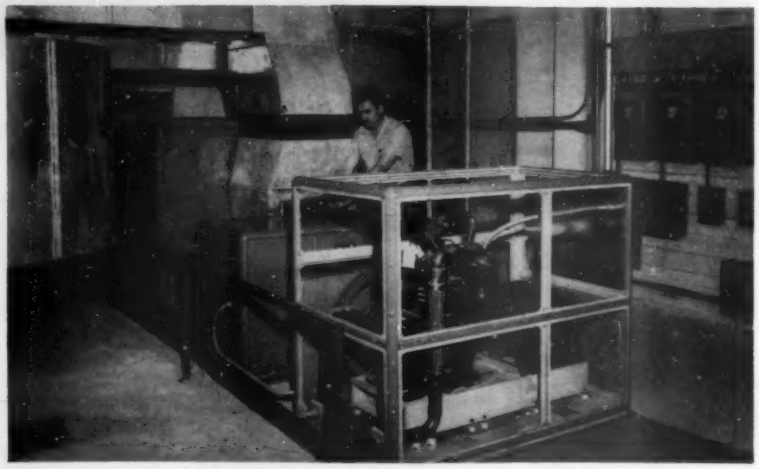
However, now that a background of experience and a list of satisfied customers has been built up, the number of distribution outlets is expected to increase rapidly. If the electrical contractors or retailers in any community do not avail themselves of the opportunity to get in on the ground floor of this development, plumbers are a logical second best bet.

One factor favoring the electrical man is that most of the manufacturers now in the field or about to get in are manufacturers of other electrical appliances including room air conditioners. There are now about twelve manufacturers of heat pumps, some of whom have only recently introduced their package units.

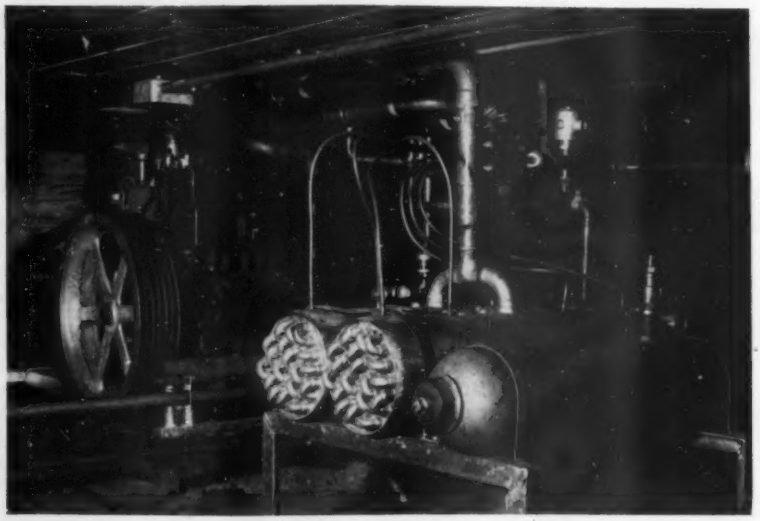
Public acceptance of heat pumps was strikingly demonstrated recently by a survey conducted by

(*Continued on page 90*)

Floyd T. Christian, superintendent of public instruction, Pinellas County, Florida (left) and Guy C. Hall, Florida Power Corp., inspect a recently-installed heat pump in one school.



This make-up type of heat pump installation is now being largely supplanted by package units being marketed by about a dozen manufacturers.



A recent 85 hp installation, of which one unit is shown, now provides the Crisp County, Ga., courthouse with year-round air conditioning.

SPEED INSTALLATION

with these Leviton surface type wiring devices

LEV-O-LETS speed surface installation *because* their narrow, 1¾" width allows for secure mounting on studs and joists only 2" wide or narrower . . . *because* they provide large terminals that make loop or clamp connections faster . . . *because* they provide bus bars for three-wire or thru-feed connections . . . *because* they can be used wherever non-metallic sheathed cable can be used. LEV-O-LETS are safe too—high barriers between terminals add extra insulation to the already low arcing characteristics of the sturdy, brown urea plastic used in their heavy duty construction. LEV-O-LETS meet R.E.A. and Federal specifications. Listed by U.L. and C.S.A.

LEV·O·LETS

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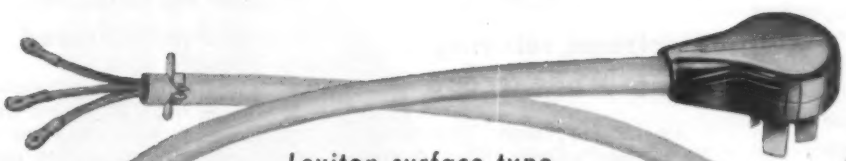

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Receptacle is made of heavy duty bakelite, with self-positioning cover secured with a single screw. 5/16" diameter terminal screws with swivel washer cups assure fast, positive wiring. Cord sets in 3 foot or 5 foot lengths with *rubber molded-on cap* or *bakelite cap*. Listed by U.L. and C.S.A.

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LEVITON **LEVITON MANUFACTURING COMPANY**

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Engineering progress reported at AIEE winter meeting

◆ THE NATION'S electrical engineers and scientists whose work is connected with the electrical arts gathered recently in New York City for the largest Winter Meeting in the history of the American Institute of Electrical Engineers. An attendance of more than 5,000 was recorded at the 95 technical sessions and symposiums, during which 410 papers on almost every aspect of electrical engineering were presented by leaders in more than a score of branches of the profession, according to C. T. Hatcher, chairman of the meeting.

Elgin B. Robertson, of Dallas, Texas, Institute president, welcomed the engineers at the opening general session.

All the technical committees of the Institute, which has a worldwide membership of more than 47,000 and is the largest technical society of its kind, sponsored sessions on their specialized branch of the electrical art.

The following briefs outline some of the highlights of the papers relating to the electrical construction industry and the electric light and power industry.

Phase converter efficiency studied

ALTHOUGH three-phase motors, of 3 to 10 horsepower such as used for air conditioning and pumping purposes, can be used where only single phase power is available by utilizing phase converters, the ordinary single-phase motor is preferable on an economic basis.

"Analysis shows that the three-phase motor with converter on single-phase supply has a considerably lower breakdown torque than the motor alone supplied with balanced three-phase power," A. Habermann, Jr., of General Electric Company, Schenectady, said in a paper entitled "Single-Phase Operation of a Three-Phase Motor With a Simple Static Phase Converter." "This and other performance features . . . suggest that, after all, the ordinary single-phase motor is preferable on an economic basis."

The phase converter, he explained, usually consists of two capacitors, one for starting and one for running, with a voltage sensitive relay that shifts from one to the other when the motor comes up to speed. In his conclusions, Mr. Habermann said:

"This study has indicated that the simple phase converter cannot produce completely balanced terminal voltages at full load, so there must be a derating of the three-phase motor when operated in such a way. If this were not done, one would be operating the motor in a maner that experience has indicated would shorten its life and would not provide the satisfactory margin for over-loads and line voltage variation. Ability to carry only normal load does not provide satisfaction."

Electronic relaying clears in one second

AN ALL-ELECTRONIC, directional-comparison carrier relay system, with a maximum over-all operating time of one cycle, has been tested successfully in laboratory and field. This report was contained in a paper entitled "All Electronic Carrier Relaying Reduces Fault Clearing Time," presented by H. C. Barnes, American Gas & Electric Service Corp., New York and L. F. Kennedy, General Electric Company, Schenectady.

The new device has been protecting a 43-mile 132 kv Applachian Electric Power Co., transmission line between Roanoke and Lynchburg, Va., and will be installed permanently on the American Gas and Electric Co.'s 330 kv system in the Ohio Valley.

The electronic protective system provides the following, the engineers said: a universally applicable transmission line protective equipment with a maximum operating time of one cycle; maintained accuracy and speed of performance throughout tube life; satisfactory life through the use of reliable tubes. It is intended to provide first line protection only. Back-up protection would be provided by electro-mechanical devices.

The equipment is the result of several years' intensive study and tests to determine the best system of line relaying capable of operating under all conditions in one cycle, the engineers said.

"This development has combined into one equipment many ideas, some old and some new," they said. "The availability of this equipment for commercial use is a significant forward step toward achieving optimum use of the transmission facilities of the electric power industry."

Higher voltages for transformers tested

THE POSSIBILITY that transformers can be built for much higher transmission voltages than now contemplated was brought out by one paper at the AIEE Winter Meeting.

In describing tests on a transformer unit built especially for low frequency, 700 kv tests, H. B. Hansen and F. J. Vogel, Allis-Chalmers Mfg. Co., Milwaukee, Wisc., engineers, said:

"It can be concluded that transformers can be built for much higher transmission voltages than now contemplated, if properly protected and advantage is taken of all limiting factors."

The engineers pointed out that many questions have been raised as to the behavior or the insulation in high voltage transformers and one of the best ways to satisfy such a question was to "try it out." This procedure is a major project as

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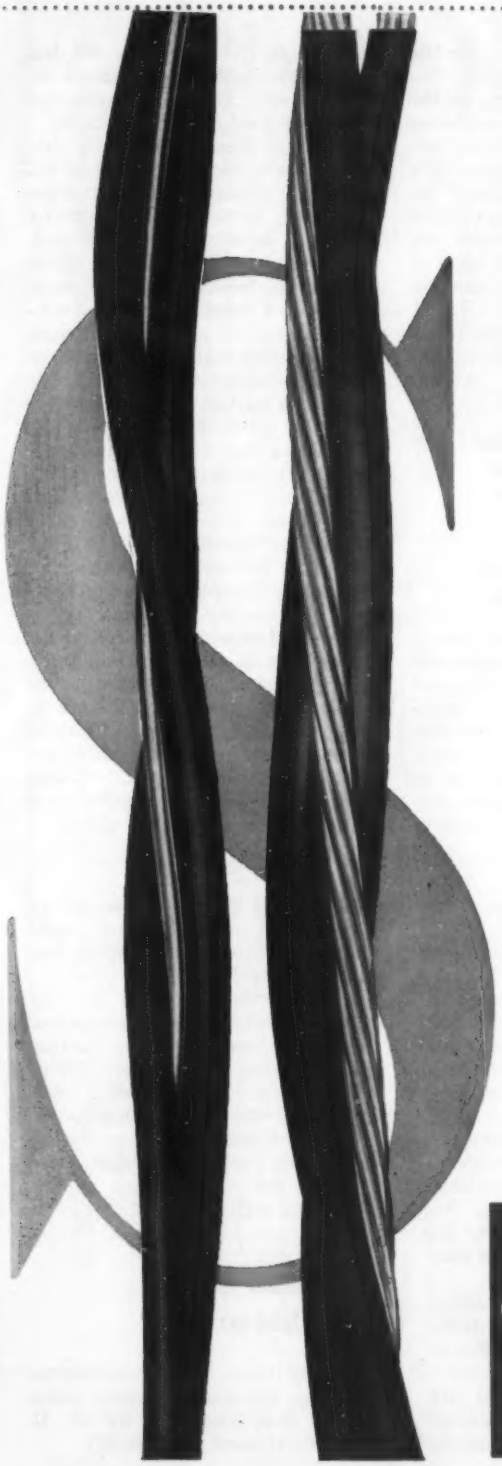

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such transformers are expensive, hence it was decided to build the 700 kv transformer following commercial practices.

The number of truns per coil were quite large as compared to the usual commercial unit, they said, and the core was small but care was taken to see that the proportions were "entirely representative."

In reporting their conclusions, they said: "It is not the mere success of the undertaking that is significant, but rather that analytical and graphical methods can be applied, with fundamental data on the strength of materials available, to formulate design procedures analogous to those used in mechanical design. These methods have been used previously for lower voltages up to 230 kv. Hence the success obtained was to be expected, and means that empirical methods are not required. Deviations from empirically determined proportions do not need to be feared if analytical methods are available. Further, there need be no great fear in extending either test or operating voltages provided the need exists."

Telemetering helps Tie-in power flow

How the Tennessee Valey Authority improved service to the utilities interconnected with its sprawling hydro-electric system in Tennessee and neighboring states by use of high speed frequency type telemetering equipment and high speed electronic load control equipment, was described by two TVA engineers.

The total nameplate rating of the generating capacity of the TVA system is five million kilowatts, posing peculiar problems in interconnections, C. P. Almon, Jr., a vice-president of AIEE, and John Donelson, Jr., both of TVA, pointed out. One of the problems is controlling the amount of power flowing over the TVA tie lines between neighboring systems "without passing on to the other systems any undue fluctuations," they said.

In describing laboratory and field tests made to analyze the performance of the telemetering and load control system which has been in use since 1950 the two engineers reported that:

1. The variable-frequency-type telemetering equipment . . . produced improvements in tie-line regulation over that obtained by the impulse duration.

2. Making use of high-speed electronic load control equipment and high-speed telemetering on specified hydroelectric generating units, the generation changes are in the direction to reduce the tie-line load swing in about 2½ seconds.

3. When high-speed telemetering was used with slow-speed load-control equipment to another specified hydroelectric plant, the generation changes were in the direction to reduce the tie-line load swings in about 14 seconds.

4. The regulation of frequency can be improved over that obtained from low-speed load control or governor action.

5. An off-and-on control did not give the same results of a proportional control with reset action regardless of the reduction in time delays and bench mark used whether it be tie-line load or frequency or both.

6. The present control has operated since 1950 and has required very little maintenance. Neither has any extra governor or turbine maintenance resulted from its use.

7. The reduction or elimination of over-regulation as secured with high-speed load-control equipment reduced the band width of the regulating units.

ES Data Sheet Series to appear monthly

◆ A VALUABLE new service for the electrical trade begins with this issue of ELECTRICAL SOUTH in the form of a series of data sheets covering a wide range of electrical information. Each month from four to eight of these sheets will be published in a form permitting them to be removed from the magazine and punched for filing in a pocket-size three-ring or six-ring binder.

The data sheets will cover practically every phase of electrical information, divided into several general sections:

I—Electrical Wiring Design
II—Electrical Applications
III—Electrical Estimating
IV—Electrical Installation
V—Electrical Testing
VI—Electrical Maintenance
VII—Electrical References

The purpose of the data sheets is to supply this valuable reference material in a form that can be used more conveniently than if published in the usual magazine-size pages. The data sheets are being prepared from month to month as published, and for this reason will reflect the newest developments in each field; and wherever the National Electrical Code rules are involved, will be based upon the most recent edition of the Code.

The data sheets will not be published in any specific order but will appear in groups of two or three from each section. This month for example, several pages are published from Section VI on Electrical Maintenance. These pages constitute a brief guide to the subject, and future pages will include more detailed maintenance data on electrical equipment of all kinds. The pages will be arranged so that they may be filed by sections, and in alphabetical order within each section by subject matter. Where one subject requires more than a single sheet, the pages will carry consecutive numbers for easy filing.

In order to make such data sheets reasonably complete some of them must of necessity be elementary in nature and especially suited to the newcomers in the electrical business. However, the system to be followed will permit each issue to contain some data sheets of a more advanced nature along with the elementary ones so that all readers will find some information that will suit their particular needs.

New lead alloy for cable use

A NEW LEAD ALLOY, containing tellurium for use as power cable sheaths was reported by G. B.

(*Continued on page* 40)

ELECTRICAL MAINTENANCE GUIDE

EFFECTIVE maintenance of electrical equipment begins with proper applications and correct installation. Manufacturers' bulletins describing specific items of equipment are usually the best guides to proper application. The National Electrical Code is the accepted standard for safe installation.

The purpose of maintenance is to *prevent* the occurrence of trouble in electrical equipment. This is best accomplished by preparing a regular maintenance schedule, covering all equipment, and following it closely.

The following paragraphs provide a general guide for the maintenance of electrical equipment. More frequent inspections may be required for equipment in dirty or damp locations, or for equipment subjected to severe loading conditions. Wherever possible, obtain the specific maintenance instruction sheets accompanying each piece of equipment and follow their recommendations.

WIRING

Wires and Cables

Wiring systems subjected to vibration should be inspected monthly. All mechanical connections such as locknuts, bushings, etc., should be tightened. Bond wires and ground connections should be checked. Check system to make certain that no hazards have developed since last inspection such as oil or water leaks near raceways, steam pipes installed near cables or raceways, high temperature conditions developed in vaults or special rooms, etc. Examine all wiring in switch boxes, motor connections, etc., for possible mechanical injury. Where vibration is not present, this inspection should be made annually.

Examine drop cords and portable cables every three months when in regular use. Repair any damage or severe wear such as found at point where wire enters lamp sockets, plugs, and portable appliances. Keep extension cords away from radiators, steam pipes, nails, hooks, and other metal objects. Keep rubber cords out of sunshine as much as possible and free of oil, grease and chemicals. Keep lamp guards in place.

Switch Boxes, Panel Boxes, Etc.

Inspect all metal boxes of the wiring system monthly. (In locations that are particularly dusty, boxes should be cleaned out weekly.) Make certain that all covers fit tightly and are in place; keep all unused "knockout" holes plugged tightly. Bond wires and ground connections should be checked.

Electrical Maintenance—VI

Electrical Maintenance Guide—Pg. 2

Fuses and Switches

Inspect all fuses twice each year to ascertain that circuits are not overfused. Keep fuse clips clean and tight and check all connections to prevent overheating. Inspect closely for any evidence of overheating as a result of high resistance contacts or overloads. Examine refillable fuses, replacing charred cases, making certain that cases are refilled with links of proper rating, and that fuses are assembled tightly.

Inspect switches at same time fuses are checked. Inspect closely for evidence of overheating as a result of high resistance contacts or overloads. Check operation of "quick-break" features, etc.

LIGHTING EQUIPMENT

Need for Regular Maintenance

Lack of maintenance of lighting equipment may reduce available light by as much as 50 per cent or more. This loss represents a loss in investment, increased operating expense, and may cause accidents and production loss. Type of maintenance schedule needed will vary widely with type of plant and size of installation but it should include the following five-point program:

1. Provide easy access to all luminaires.
2. Clean luminaires regularly with soap and water.
3. Replace lamp outages.
4. Paint walls and ceiling light colors and keep them light.
5. Maintain rated voltage at luminaires.

CONTROL EQUIPMENT

Keep Equipment Clean

In dusty locations, clean and blow out all starting switches, compensators, controllers, and air circuit breakers at least weekly. Do not allow dust or dirt to accumulate on high voltage bushings or terminals. Do not permit an accumulation of dirt, oil, grease or water on the operating parts of control equipment. In damp or corrosive atmospheres, paint control parts quarterly or semiannually. In clean locations quarterly or semiannual cleanings will suffice.

Check Mechanical Conditions

The mechanical condition of all control equipment should be checked weekly if subject to vibration or monthly otherwise. Tighten all nuts and screws; examine electrical and

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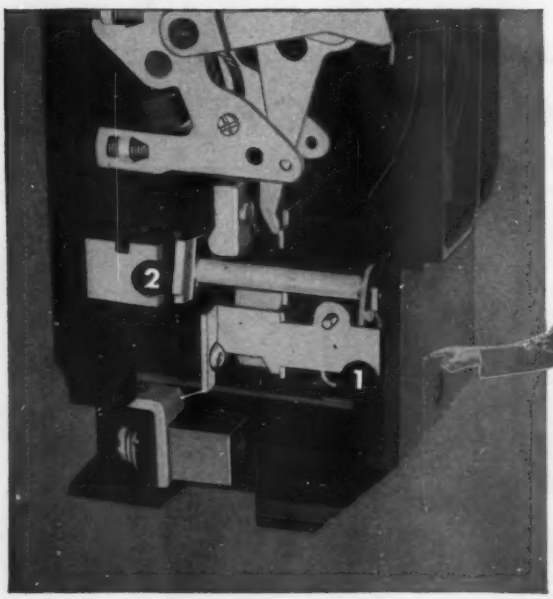


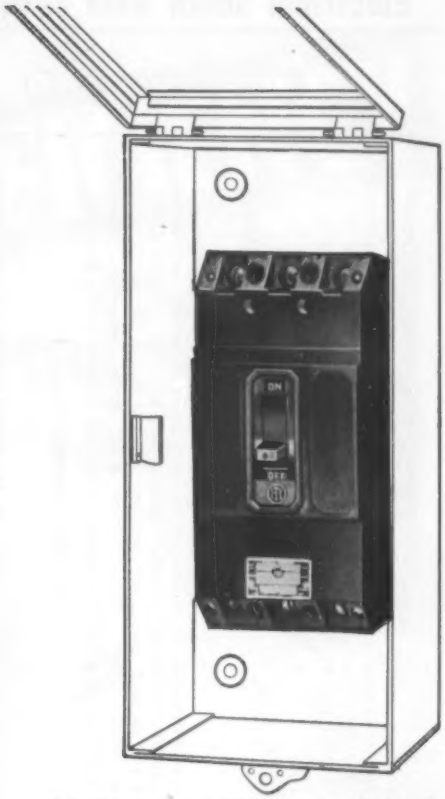
1. *Thermal time-delay trip* provides dependable overcurrent protection. Prevents circuit interruption on harmless overloads.

2. *Magnetic instantaneous trip* assures split-second tripping on short circuits.

Service restored . . . *in seconds*

If an I-T-E breaker trips on a fault, service is restored *in seconds*. Merely resetting the operating handle permits production to continue. There's no waiting, no excessive downtime. And remember—if a breaker trips *just once*, it may pay for itself in the production time it saves!

Three-position operating handle indicates at a glance whether breaker is ON, TRIPPED, or OFF. No specialized personnel required to restore service. *Anyone* can reset breaker quickly.



I-T-E 100-ampere "F" frame circuit breaker in Nema Type 1-A sheet steel enclosure.

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Once you've installed an I-T-E Circuit Breaker, there's no continuing expense—each time there's an interruption. I-T-E breakers are compact and self-contained. They are built to last indefinitely. There's no deterioration, no fussing with replacement parts. And a breaker provides maximum safety.

I-T-E Molded Case Circuit Breakers come in four frame sizes, 4 enclosures. Available in ratings from 10 to 600 amperes, up to 600 volts a-c, up to 250 volts d-c. For details about the complete I-T-E line, send for a copy of Bulletin 5108-D or contact your nearest I-T-E representative.

I-T-E

MOLDED CASE CIRCUIT BREAKERS

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Electrical Maintenance Guide—Pg. 3

mechanical connections on both panels and resistors. Check condition of "pigtail" connections closely—especially in corrosive atmosphere. Replace any damaged or worn parts, and inspect condition of magnet contact surfaces. See that control mechanism operates freely and oil or grease if necessary. Do not lubricate contact surfaces! Check operation of mechanical or electrical interlock devices.

Maintain Contacts

Control equipment subject to severe operating conditions should have contacts inspected weekly. A monthly check is sufficient for average operating conditions. Adjust, file clean, or renew contactor tips if badly worn or burned. (Ordinary roughening of contact tips due to arcing need not be serviced but large projections should be removed with a file. If there is evidence of overheating, oxide surface should be removed by a few strokes with a file.) Examine closely for any high resistance joints in contactor circuit. (A combination a-c/d-c millivoltmeter is available for checking resistance of bolted joints and contact surfaces.) *Do not lubricate contact surfaces.*

Check Oil Condition

Make semiannual inspection of oil level, and condition in starting compensators, oil switches and circuit breakers. Replace leakage and evaporation loss; replace oil if dirty or gummy. (In dirty or damp locations, inspect oil level and condition quarterly or monthly according to severity of conditions.)

Test Overload Devices

Circuit breaker tripping points should be checked monthly. Replace dashpot oil if thick and gummy. Keep orifices in plunger clear. Keep leather bellows soft and pliable with neat's foot oil. Be sure that heater coils for thermal overload relays are the correct size. Check overload relay settings every six months.

SUBSTATION EQUIPMENT

Transformers

Test temperatures of transformers operating at full load at least once a month. Oil temperature of oil-immersed self-cooled transformers should never exceed 90 Centigrade and such transformers should not be permitted to operate for long periods of time above 80 Centigrade.

Electrical Maintenance Guide—Pg. 4

Check oil level in transformers every three months and replace leakage and evaporation loss. Inspect for oil leaks in transformer tanks. Check ground lug and ground circuit.

Condition of transformer oil should be tested at least once each year. If the dielectric strength is less than 18 kv, oil should be reconditioned. New oil should be tested before being placed in transformer and should have a dielectric strength of at least 18 kv.

Lightning Arresters

Inspect all lightning arrester connections in early spring just before lightning season and every other month during summer. Measure ground resistance just before lightning season begins; if it exceeds five ohms, make necessary improvements to lower it to five ohms or less. *Never run ground wire through iron or steel pipe for protection against mechanical injury unless wire and pipe are bonded together.*

MOTORS

Follow Specific Instructions

Wherever specific maintenance instructions for a particular motor are available, they should be followed closely. In the absence of such specific instructions, the following periodic checks should be made. These are based on average conditions with regard to severity of duty and dirtiness of location. The frequency of the inspections can be varied to suit actual plant conditions.

Weekly Inspections and Operations

1. Examine commutator and brushes.
2. Check oil level in bearings but do not over-lubricate.
3. See that oil rings turn with shaft, and note any excessive end play in shaft.
4. See that shaft is free of oil and grease from bearings.
5. Examine starter, switch, fuses, and other controls, as well as ground connection and motor leads.
6. Open-type motors in dusty locations should be blown out thoroughly.
7. Check air gap between rotor and stator. The difference in width of gap around circumference will indicate extent of wear on bearings. This check should be made weekly on motors operating with excessive belt tension; otherwise check air gap semiannually.
8. Start motor and see that it is brought up to speed in normal time.

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Electrical Maintenance Guide—Pg. 5

9. Check motor and bearing temperature under actual load conditions by feeling with hand.

Semiannual Inspections and Operations

1. Clean motor thoroughly, blowing out dirt from windings and wipe commutator and brushes.
2. Inspect commutator clamping ring.
3. Check brushes and renew any that are more than half worn.
4. Examine brush holders and clean them if dirty. Make sure that brushes ride free in holders.
5. Check brush pressure.
6. Check brush position.
7. Drain, wash out, and renew oil in sleeve bearings.
8. Check grease in ball or roller bearings.
9. Check operating speed or speeds.
10. See that end play of shaft is normal.
11. Inspect and tighten connections on motor and control.
12. Check current input and compare with normal.
13. Run motor and examine drive critically for smooth running, absence of vibration, worn gears, chains, or belts.
14. Check motor foot bolts, endshield bolts, pulley, coupling, gear and journal setscrews, and keys.
15. See that all motor covers, belt and gear guards are in good order, in place, and securely fastened.

Annual Inspections and Operations

1. Clean out and renew grease in ball or roller bearing housings.
2. Test insulation by megger.
3. Clean out magnetic dirt that may be hanging on poles.
4. Check clearance between shaft and journal boxes of sleeve-bearing motors, to prevent operation with worn bearings.
5. Clean out undercut slots in commutator.
6. Examine connections of commutator and armature coils.
7. Inspect armature bands.

Complete Overhauls

Motors should generally be given an overhauling at intervals of five years or so, normally, or, if the service is more severe, more frequently. Such a practice is beneficial in avoiding breakdowns and in extending the useful life of the equipment.

AIEE reports

(*Continued from page* 34)

Shankin and Dr. J. F. Eckel, of General Electric Company, Schenectady, who told the engineers that extensive tests have shown that "it possesses a combination of stabilized bending and creep properties that are superior to those of any other cable sheath alloy now in use.

"Factory extrusion studies have shown that the new alloy is easily controlled during extrusion operations with standard lead press equipment, and with a wide latitude of heat treatment.

"Heat application at joint end wipes, and other such locations, does not affect its desirable properties.

"Since completion of the development of tellurium alloy sheaths, several large commercial orders of cable with this type of sheath have been produced."

General Electric has been actively pursuing the goal of finding an improved type alloy sheath with maximum long-time bending and creep strength characteristics for years, the engineers said.

New rating basis for circuit breakers

A NEW BASIS for rating power circuit breakers was recommended by a working group of the AIEE Committee on Switchgears.

"The proposed method of rating" the group reported, "offers important advantages over either the present American Standards Association or proposed International Electrical Commission method. After industry has had an opportunity to review and study this report, and to make comments and suggestions, it is recommended that this method — including such revisions as may be found desirable — be adopted as the standard."

Four advantages of the proposed method over the international method were cited:

1. Combines closing capability with symmetrical and asymmetrical interrupting capability in one single short circuit current rating.

2. Greatly simplifies application. The computed initial symmetrical short circuit current at no load equals the required breaker rating when the system is loaded.

3. Requires no consideration on the part of the user of breaker opening or interrupting time. The rating automatically covers all breaker speeds, including those of future and faster breakers.

4. Makes possible more economical breaker design because no unusuable capacity need be included.

Advantages over the present ASA method were summarized as follows:

1. The short circuit current method of rating becomes more consistent with present short time ratings of transformers, current transformers, reactors, circuit reclosers and other electrical equipment.

2. Present ratings for momentary, making, latching and interrupting currents are combined into a single rated short circuit current.

3. Makes application of power circuit breakers much more simple.

One of the objects of the working group was to take cognizance of the work of the IEC "so that, if adopted, a new standard would be a step in the direction of, or compatible with, the International Standards for alternating current circuit breakers."

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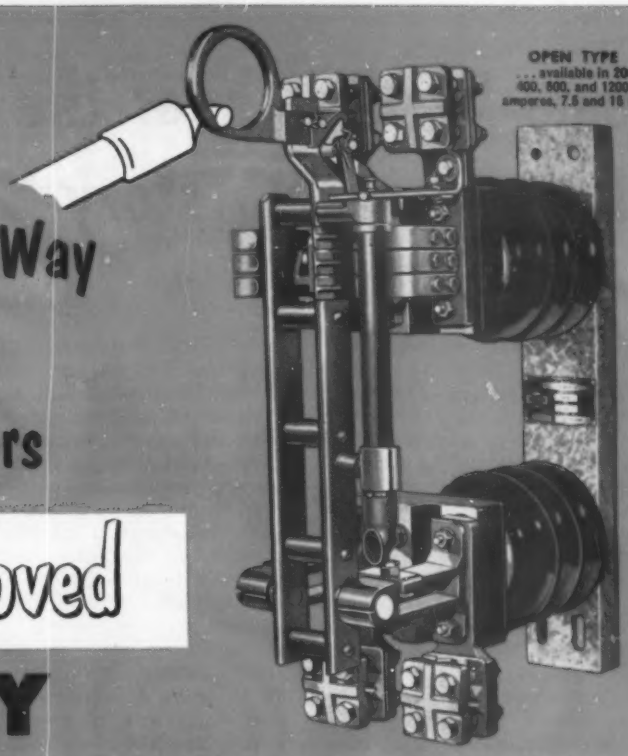

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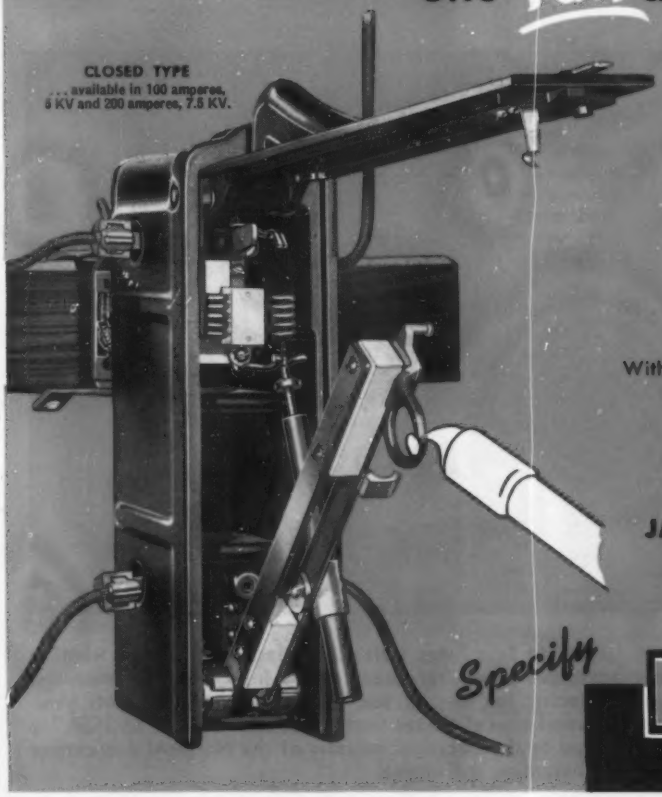
. . . available in 200, 400, 600, and 1200 amperes, 7.5 and 15 KV.



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For Better Construction . . . Safer Maintenance

243

Home builders hear the adequate wiring story

◆ THOUSANDS of young home owners in new project-built houses which they think are electrically modern have wiring systems which prevent them from adding to their furnishings any major electrical appliances beyond a few basic items.

This bars them as purchasers of air conditioners, electric dryers, freezers, broilers, sandwich grills, and other current-hungry equipment, Carl T. Bremicker, vice-president, Northern States Power Co., told home builders in annual convention in Chicago, recently. He spoke for the electrical industry as a commentator on a comedy skit which brought to builders some typical Young Married domestic crises based on inadequate wiring situations.

The 3-act comedy, "Electrical Angles of 1954" was one of a pair of comedy presentations given a two-hour segment of the National Association of Home Builders' program on its opening afternoon. The National Adequate Wiring Bureau and the Industry Lighting Committee each sponsored a feature using a professional cast and producer, and elaborately-designed stage sets. Both were making their first program bows at any builders' annual convention.

Services are too small

Mr. Bremicker, a member of the National Adequate Wiring Bureau executive committee, representing the Edison Electric Institute, told an audience of builders that the typical service entrance—3-wire, 240-volt panel, 60-amp capacity—going into thousands of the better project-built homes today, can supply only a little more than 14,000 watts of demand on service entrance conductors and the main panel. That is enough for the requirements of basic lighting and one or two heavy current-consuming appliances.

But 1954 sales of additional appliances like electric clothes dryers are estimated at more than 600 thousand, dishwashers at a quarter of a million, freezers a million and a quarter, and the saturation point is far away. The Bill and Bess Joneses of America, according to Mr. Bremicker, can't use these products in addition to their basic electric equipment, with 60-amp service entrances. Builders would have, he stated, a "terrific selling feature" in the extra service entrance capacity found in a 100-ampere panel which could be sold as an "expandable wiring system."

He stated that an additional solution could be found in the use by builders of a three-wire 240-volt circuit to kitchen and laundry outlets in place of a standard two-wire 20-ampere appliance circuit, thus doubling the current capacity. Using this method would give twice the capacity with only 50 per cent more wire.

John Bonforte, low-cost builder of Colorado Springs and Pueblo, Colo., took the speakers' rostrum at the afternon session devoted to lighting and wiring, to report that he presents with his houses the adequate wiring certificates of the Rocky Mountain Electric League, an organization authorized to certify wiring on behalf of the National Adequate Wiring Bureau. He is able to include this high quality wiring in houses selling for as low as $9,500.

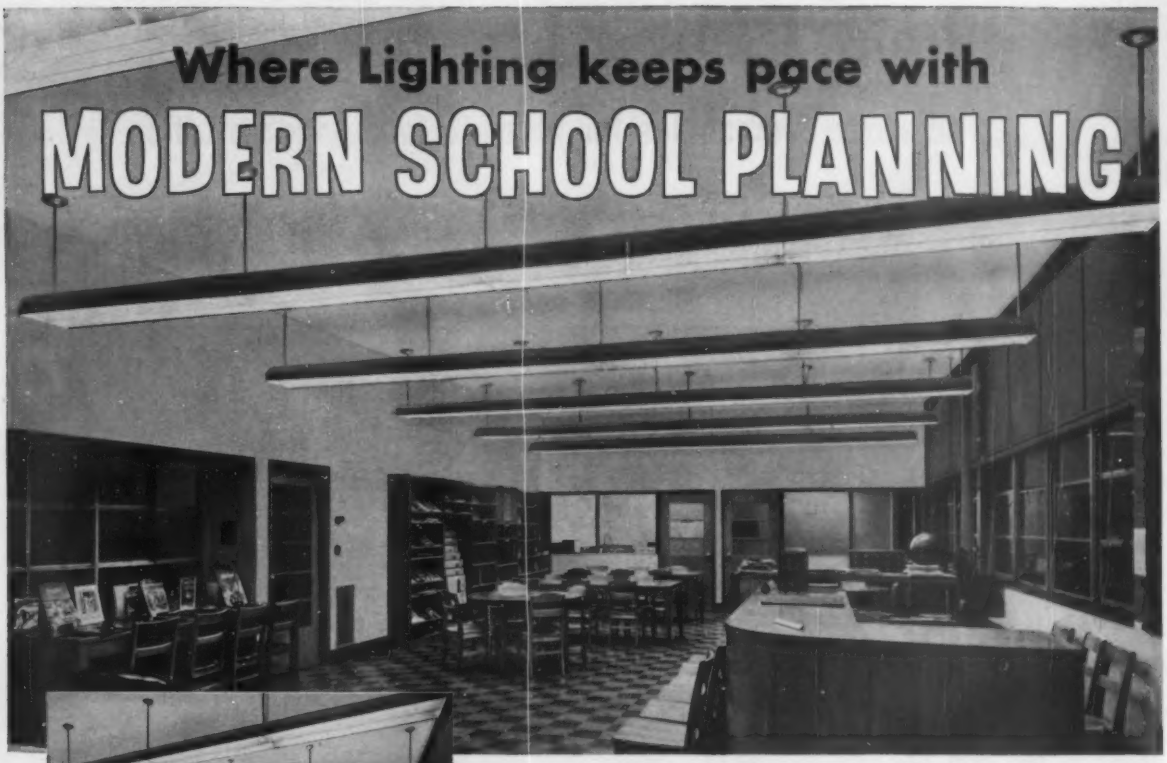
Andrew Place, Place and Co., South Bend, Ind., described savings on installation cost for the builder, and satisfaction for the customer in his use of a method of running one circuit from the service panel each way around the outer walls of a house, employing a 3-wire system. He has increased the size of the service panel from 60 to 100 amperes. The resulting job, he said, cost four dollars less than his earlier wiring methods.

Adequacy helps sales

Clair Wilson, Omaha builder, said that he features electrical capacity for the future in his selling of houses in the moderate-price class, and that he plays up his 100-ampere service panel installation. It costs very little more, he reports, to install the higher-rated service panel than the 60-ampere panel.

Said Bill Jones (right) to Bess Jones (left) in domestic tangle over whether use of the air conditioner takes precedence over a fight night on television, "We can use the electric fan instead, see?" They did, and the lights blew. This was one of several typical scenes from "Electrical Angles of 1954," a comedy skit presented by the electrical industry at the National Association of Home Builders Convention in Chicago.

Where Lighting keeps pace with MODERN SCHOOL PLANNING



New Sylvania IC Fluorescent Fixtures meet highest standards of new Thomas Jefferson Junior High School, Clairton, Penna.

Notice the soft, well-diffused light provided by these Sylvania IC Low-Brightness Fluorescent Fixtures in these modern classroom installations. *Architect:* Joseph Hoover, Hoover Building, Pittsburgh, Penna. *Electrical Engineer:* Elwood S. Towers, Investment Building, Pittsburgh, Penna.

In planning this handsome new junior high school, educational authorities, architects, and lighting engineers agreed that the new Sylvania IC Low-Brightness Fluorescent Fixtures with 42° crosswise shielding met their strict requirements for uniform light distribution, quick easy installation, low maintenance, and attractive appearance.

On the subject of installation and good business, Mr. George W. Hiles, the Electrical Contractor for this job, wrote: "We are glad we used Sylvania Fixtures on this job. We saved ourselves a lot of time because they are so easy to install. One day, using 8 men, we installed 114 fixtures. Another good feature is Sylvania's guarantee that covers their fixtures and lamps during the period we service the over-all job. The way we figure it, we're ahead of competition every time we use Sylvania fixtures."

Let us give you full information concerning the many advantages of Sylvania's new line of IC Fluorescent Fixtures. For illustrated folder simply address Sylvania, Dept. 4X-2502, today.

George W. Hiles
Hiles & Lightholder Co.
Electrical Contractors
Canonsburg, Penna.

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

In Canada: Sylvania Electric (Canada) Ltd., University Tower Bldg., St. Catherine Street, Montreal, P. Q.

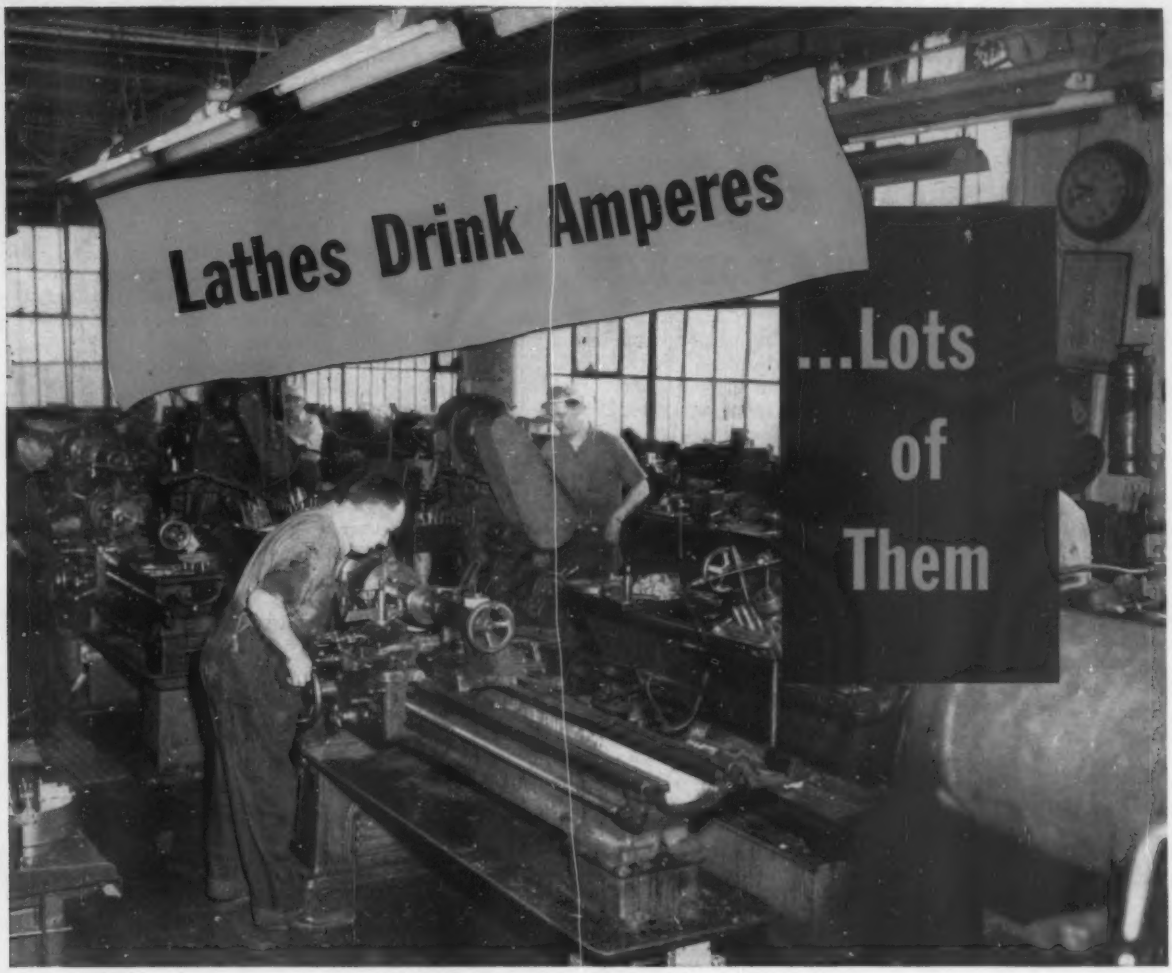
LIGHTING • RADIO • ELECTRONICS • TELEVISION

Problem in lighting:

adequate footcandles for a comfortable modern office

by J. A. Savarese, Jr.
Lighting Specialist
Tampa Electric Co.

When membership of the Tampa Motor Club, an affiliate organization of the American Automobile Association, increased to over 26,000 members, officials agreed that the time had come to move from the crowded and inadequate office in the basement of the Chamber of Commerce Building. One of the major problems in the old location was lighting, and in finding a new location, a comfortable seeing condition was the first consideration. When the new office was found, lighting specialists of the Tampa Electric Company were called in to do the job, and Motor Club officials have commended them as having "literally turned night into day." Two continuous rows of three-lamp, four-foot slimline units with Albalite glass panels were used for the lighting installation. The ceiling is white acoustical tile, walls are light in color, and light gray furniture also assists to provide best reflection factors and eliminate brightness contrast. Footcandle levels were increased from a "spotty" 12 footcandle average in the old office to a general over-all level of 65 footcandles maintained in the new building.



Lathes, grinders, milling machines, drill presses and other machine shop equipment use plenty of amperes in their operations. If you slow down or stop these operations, you interrupt production; and when you interrupt production, you interrupt profit.

The power supply of these production tools must be constant. If equipment slows down because of poor wire and cable, work in process may be spoiled. If the production equipment stops, then machine time and labor are wasted.

Simplex-ANHYDROPRENE Wires and Cables are ideal for wiring to machine tools. The neoprene jacket is resistant to oil mist and cutting oils. These wires are light in weight and small in diameter. They are fast and easy to install. Their smooth neoprene jacket permits easy pulling through conduit. They do not have fibrous braids to fray or rot.

Whether you are wiring a small laboratory shop, or a large production shop, use Simplex-ANHYDROPRENE Wires and Cables. You can depend on them.

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

New developments

that help to build business

Group relamping advantages demonstrated with visualizer

THANKS to a fascinating new demonstration tool developed by General Electric's Lamp Division, electrical contractors and lighting men throughout the country are able to prove graphically that Planned Group Relamping "pays big dividends."

The new device is called the "G-E Lamp Burnout Visualizer." It is designed especially for demonstration to managers of factories, stores and offices. It exposes the hidden costs of "spot relamping" and reveals the benefits to be had from planned group relamping. A much larger companion visualizer has also been developed by G-E to demonstrate to audiences how the Lamp Burnout Visualizer works.

Resembling a punch board and operated like a slide rule, the Lamp Burnout Visualizer consists of three parts: a perforated paper envelope 8½ inches by 10 inches in size; a four-page telescoping insert; and a four-page explanatory folder. The 100 punched holes in the envelope represent 100% of the lamps in any lighting installation. Sliding the insert back and forth reveals black spots representing the number of burnouts to be expected at various stages of average lamp life.

The larger portable demonstration device for audience presentations employs illumination to highlight the advantages of planned group relamping.

Reducing a complex problem to simple easy-to-grasp terms, the new G-E Lamp Burnout Visualizer shows how labor time—the leading factor involved in the cost of relamping — can be reduced from 60% to 85%!

Among the surprising facts revealed and visualized are: replacing 100 burnouts one at a time takes 33 hours of a maintenance man's time and probably an equal number of hours of lost production time; the labor cost per lamp-change is often higher than the cost of the lamp itself; labor costs may be such as to make it advisable to put in new lamps in all sockets at 20% of burnouts!

The "G-E Lamp Burnout Visualizer" helps users of large and small lighting systems to understand why the following five-point relamping program proposed by G-E is advisable:

(1) Check present lighting. (2) Employ group relamping, instead of spot relamping, to enjoy mass production benefits. (3) Save the cleanest, brightest 20% of lamps for spares. (4) Replace burnouts from these spares. (5) When all spare lamps have been used, commence next relamping cycle.

Other benefits besides labor savings "visualized" for the user of the new device are: elimination of interruptions during working hours; longer life for lamp auxiliary equipment; neater looking lighting system; improved employee morale; higher level of lighting maintenance; and lower accident rate.

Alston Rodgers, left, of the G-E Lighting Institute demonstrates the use of the portable Lamp Burnout Visualizer which enables electrical contractors and lighting men to demonstrate the economy of group lamp replacement.

New fan-duct system simplifies ventilation

A NEW SALES opportunity for the enterprising electrical contractor has developed in the field of home ventilation. The new device, which is also suitable for small business establishments, is called the Stewart Kitchen-Aire Model KA-17 and is being marketed by distributors for Stewart Manufacturing Co., Inc., 318-X East St. Joseph St., Indianapolis.

The three-speed ventilating fan is designed to remove odors, moisture, heat, grease and smoke from the kitchen, bathroom, and laundry, or other combination of rooms, through one vent system. Either wall or roof mounting may be made of the unit in weatherproof aluminum housing. The fan always pulls from the outside through standard, low-cost seven-inch round ducting leads to grilles inside the home. Adjustable diffuser grilles may be substituted for the second and third interior grilles, as required by varying ventilating needs.

(*Continued on page* 49)

Now! Complete Flexibility

THE NEW, IMPROVED *Wheeler* DURATACH LINE

Complete Interchangeability

New design permits use of any Duratach Reflector with any Duratach Canopy Assembly, thus easily adaptable to any installation.

3 methods of hanging

to meet all lighting requirements . . . basic PENDANT installation, with simple conversions to SIDE OUTLET and OUTLET BOX.

5 Reflectors

each designed to do a specific lighting job

RLM Standard Bowl

RLM 30° Angle **RLM Deep Bowl**

Shallow Dome **Elliptical Angle**

Wheeler **REFLECTOR COMPANY**
275 Congress Street, Boston 10, Mass.
Distributed Exclusively through Electrical Wholesalers

For complete information write for New
DURATACH BULLETIN

PRODUCTION SPEEDED AT SYLVANIA'S ELECTRONICS DIVISION NEW PLANT AT WOBURN, MASS. with

Aerial view of Sylvania's modern new electronics plant at Woburn, Mass.

Interior of Sylvania's Electronics Division new plant at Woburn, Mass. showing the effective use of FA Powerplugin and Hi-Efficiency Busduct to carry power from service entrance to all parts of the plant.

FA Powerplugin with a plugin outlet every foot of the way gives Sylvania the efficiency, flexibility and economy of operation so vital today.

FA Powerplugin and Hi-Efficiency Busduct are available in the following capacities:

FA Powerplugin — 250 to 1,000 amperes, 600 volts AC or less, with Klampswitchfuz, (disconnect) Shutlbrak (operating) and Circuit breaker plugin devices for 200 amperes and less, 2, 3, and 4 conductor, solid neutral types.

FA Hi-Efficiency Busduct — 600 to 4,000 amperes, 600 volts single phase for welding service; three phase or three phase, four wire service for light and power.

Powerplugin and Hi-Efficiency BUSDUCT

SYLVANIA, like many other companies throughout the country, found that FA Busduct added greatly to the efficiency, economy, and flexibility of its operations.

That is why the company installed FA Powerplugin and Hi-Efficiency Busduct in its Electronics Division new plant at Woburn, Mass. and others.

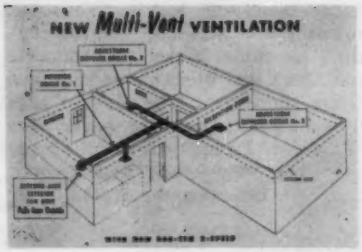
FA Busduct enables the company to make quick changes in plant and structural layouts without disrupting production. It eliminates temporary connections and long lead-ins, cuts maintenance costs and affords big savings by reducing power loss and voltage drop to a minimum. Too, it is 100% salvageable.

Built in standard ten foot lengths, FA Busduct can be easily arranged to run horizontally at floor level or overhead, through tunnels, under the street or through walls or roof. Dust-resisting and raintite construction available for specific installations.

If, like Sylvania, you want an efficient, economical, and flexible system of power distribution for your plant, ask your nearest FA representative, listed in Sweet's to tell you about FA Busduct.

Frank Adam Electric Co.
P. O. BOX 357
ST. LOUIS 3, MISSOURI

Makers of: BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER



Ceiling ducts of standard size connect the Stewart milti-vent fan and three grille outlets in a typical home installation.

The outside fan housing can be mounted either horizontally or vertically according to the nature of the installation being made.

The three-speed fan operation also affords capacity variations for different seasons of the year, with 800 cfm at high speed, 400 cfm at intermediate speed, and 200 cfm at low speed.

Exterior mounting of the complete operating fan unit allows smaller vent holes in the wall or ceiling—7⅝ inches and 6⅝ inches, respectively, for 7-inch and 6-inch ducts.

Another feature of the new fan which is attractive to architects, builders, home modernizers and home owners is the fact that both motor and fan blade noise are outside the home, and the blade is the new self-cleaning type which eliminates the hazard of grease laden motor and blade housed in the wall of the house.

Package plan merchandising promotes wiring adequacy

A "PACKAGE PLAN" that makes available in one package all of the devices needed for the wiring of a single residence has been greeted by the electrical industry as a revolutionary forward step in assisting the distributor, architect, builder, and electrical contractor to help customers plan homes complete with every comfort and convenience modern electrical living makes possible.

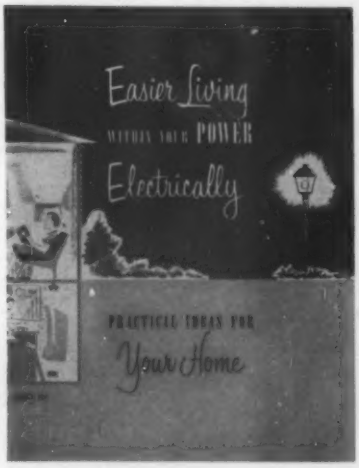
The developers of this package plan claim that it marks the first time in the history of the electrical industry that all the wiring devices needed for the home have been offered in one convenient package. In creating this plan, they feel that they are keeping in step with the popular trend toward presenting merchandise in the package plan way that makes selection, ordering and delivery exceptionally easy.

Under this "Package Plan," made available to the trade by Arrow-Hart and Hegeman Electric Co., Hartford, Conn., any one of 4 packages of wiring devices may be selected and ordered. Each package contains the wiring devices for a home of a popular size—the 4 to 4½ room home, the 5 to 6 room home, the 7 to 8 room home, and the 9 to 10 room home. Each of the 4 packages is available in 2 types, designated Plan "A" or Plan "B." A package selected through Plan "A"—recommended—will contain wiring devices to provide for both present and future needs. A package selected through Plan "B" will provide only for minimum needs.

This package plan is described fully in the last several pages of a new 40-page book "Easier Living Within Your Power Electrically" which is offered at low cost (including free imprinting) by Arrow-Hart & Hegeman. This booklet also contains dozens of stimulating ideas, exciting illustrations, and easy-to-understand diagrams. Included in the portion of the booklet that describes the "Package Plan," is a handy room-by-room check list for use in determining the wiring devices needed to provide complete electrical convenience, a listing of the cost of the wiring devices in each package available through Plans "A" and "B," the estimated average installation costs, and figures showing the small difference in the cost when applied to cost of new home.

The Arrow-Hart & Hegeman Electric Company says that when left with homeowners who are building, this booklet will "sell" the homeowners on adequate wiring and so lead to the installation of more quality wiring devices in every home.

For the convenience of the distributor, architect, builder and electrical contractor, the portion of the booklet devoted to the "Package Plan" is available separately in an attractive 8-page folder "Know What You Need to Enjoy Electrical Living Today *and* Tomorrow" (free in reasonable quantities with the booklet). It is suggested that this folder be used as a work sheet in aiding customers to determine their electrical needs accurately, and in ordering.



This 40-page booklet sells the idea of adequate wiring, as well as describing the package plan for home wiring device merchandising.

Creators of the "Package Plan" are confident that it will benefit everyone—the consumer, by making it easier for him to decide and specify what he wants and needs; the architect, by simplifying his job of planning homes with adequate wiring and making it easy for him to specify what he wants; the builder or electrical contractor, by simplifying ordering, upgrading each job and assuring customer satisfaction; the distributor, by creating larger unit sales, sales in higher priced items, and by the sale of more electrical appliances through adequate wiring.

Profit opportunities in outdoor lighting

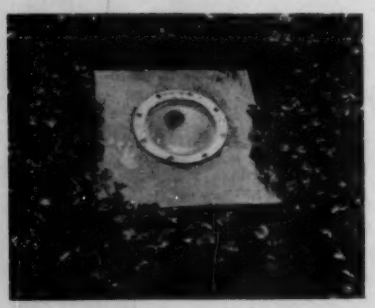
CHURCHES, parks, residences, and commercial buildings in residential areas are all prospects for outdoor lighting installations when there are attractive trees that can be illuminated spectacularly. One contractor has utilized water-tight lighting fixtures for this purpose, mounting them in a concrete box flush with the ground.

The installation illustrated consists of a row of trees which were illuminated with 44 Crouse-Hinds water-tight RCD-8 lighting fixtures.

Each fixture is flush-mounted at ground level in an individual concrete block. Wiring in conduit, buried at a depth of only six inches, supplies electricity to each fixture. Since alkalies in concrete cause aluminum (the standard material) to corrode, the fixture housing is cast iron. Its lens is heat-tempered, shock resistant glass.

To secure the lighting unit into a concrete block, contractors removed its lens cover and bolted it to the bottom panel of a wooden form box. They then filled the box with concrete, leaving only an opening for the later use of conduit or cable. After the concrete had set, the block was removed from the form. The fixture was unbolted and its lens cover was replaced. Finally, the unit was placed in the block and located properly between the trees.

A row of trees lighted spectacularly by water-tight lighting fixtures cast in a block of concrete mounted flush with the ground level.



Here is one of the water-tight units in concrete buried in the ground with lens flush with ground level.

Improved controls available for electrical heating jobs

A NEW LINE of automatic controls especially designed for electric heating should enable the electrical contractor to assure his heating customers of a satisfactorily operating installation.

The new instruments, announced by Minneapolis-Honeywell Regulator Company, of Minneapolis, Minn., include both an improved line-voltage thermostat and a new silent relay for use in very high-amperage installations. Honeywell has also made its revolutionary new "round" thermostat available for use with the silent relay system.

This new thermostat, completely re-styled, features a single, easy-to-read dial, a greatly improved dust-free mercury switch, and a heat-leveling adjustment that provides control accuracy to within one-half degree. Moreover, it uses a plastic ring cover that can be snapped off and painted to harmonize with the interior decorating scheme of the home.

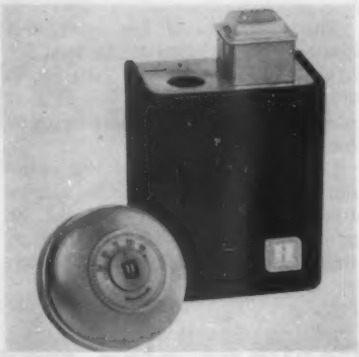
Because the sound of the switching action has been eliminated, the new relay can be installed in or near the electrically heated room. This greatly reduces wiring and installation costs. The improved, quiet operation has been achieved by eliminating all metal-to-metal contacts by the solenoid plunger.

Built to carry the high-amperage heat loads of electric heating, the new low-voltage controlled relay is available in either a single-switch model which can accommodate a single circuit up to 4,600 watts capacity, or a two-switch model which can carry two 4,600-watt circuits. Those ratings are at 230 volts.

Enclosed, dust-free mercury switches are used in both the thermostat and the relay.

The transformer is mounted atop the relay and is available in 230-volt primary with a secondary current designed to accurately match the electrical characteristics of the new round thermostat.

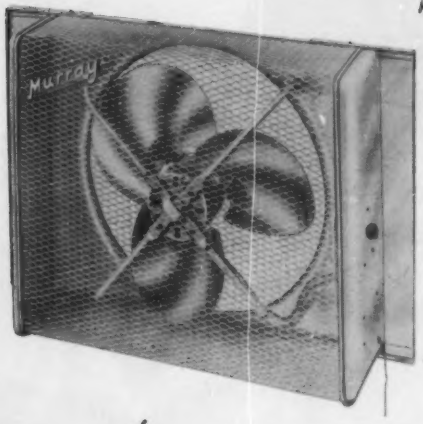
(*Continued on page* 84)



This new heavy-duty silent relay is especially suited to high amperage electrical heating loads. The new round thermostat shown can be used with it. New relay is so quiet it can be installed in or near rooms where electric heat is used, greatly reducing wiring costs.

Line voltage is controlled directly by this new thermostat especially recommended for radiant panels, strip heaters, or other electrical space heating equipment. Operating differential of only one degree is attained.

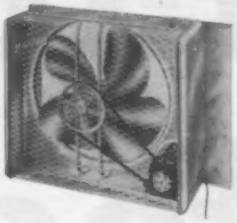
Murray 20" Window Fan
Reversible or Exhaust—
Only, 1 or 2 speed



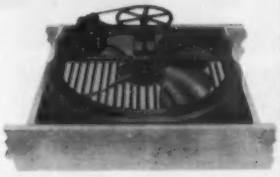
Murray 30" Window Fan
Reversible or Exhaust—
Only, 1 or 2 speed

Murray fans

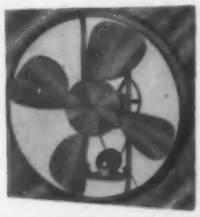
the line . . . with the South in mind



Murray 24" Window Fan
Reversible or Exhaust—
Only, 1 or 2 speed



Murray Attic Fan
Vertical Discharge



Murray Attic and
Industrial Fans
Horizontal Discharge

Murray fans are made in the South, with the Southern customer and the Southern dealer foremost in mind. Murray — and only Murray offers a complete line — a type of attic or window ventilating fan to fit every Southern home, every Southern pocketbook. Murray — and only Murray — offers a *complete* money-back inventory guarantee to its distributors. Murray — and only Murray — offers the best product, the best advertising back-up to Southern dealers. For full information on dealer and distributor franchises and free catalog, write . . .

Exclusive National Sales Agents for Murray Fans
H. C. Biglin Co., Inc.
177 Harris St., N.W.
Atlanta, Ga.

Murray 16" Window Fan
Portable room-to-room

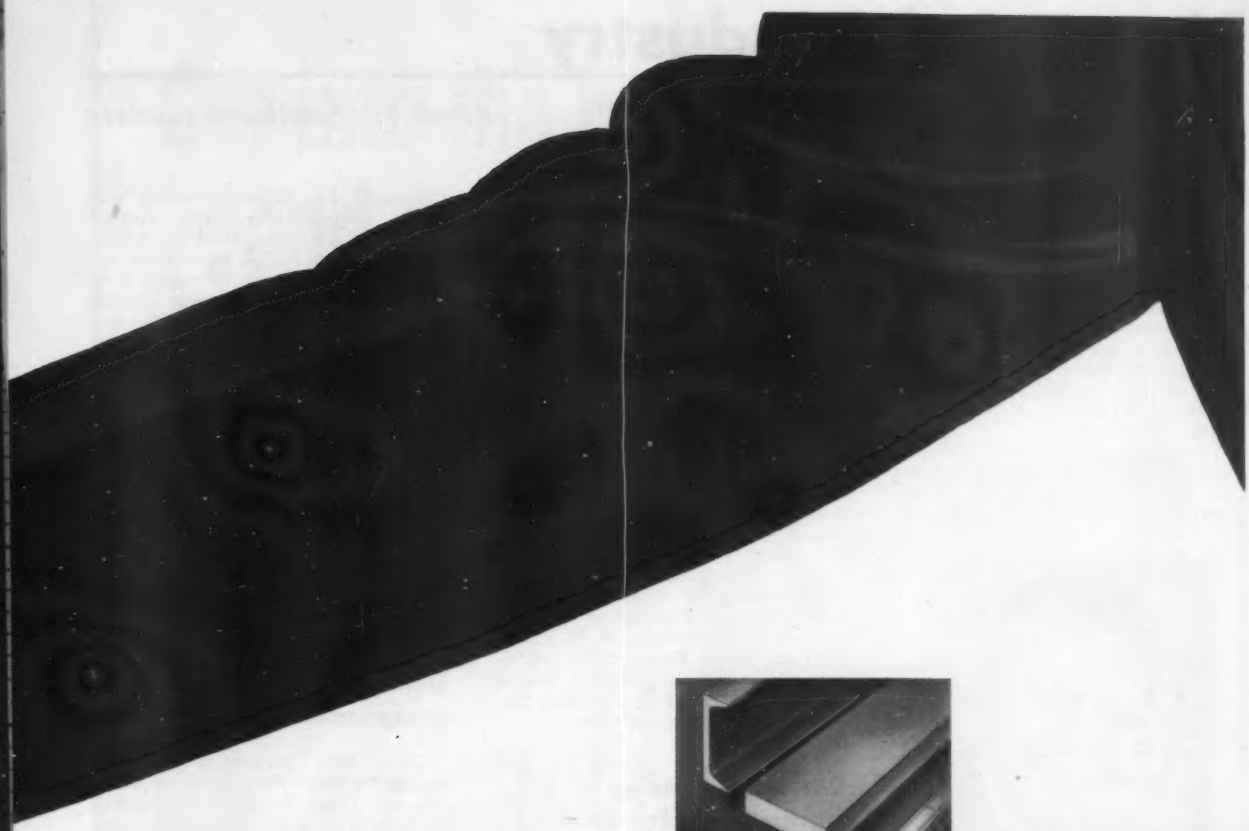
Murray Company of Texas, Inc.
VENTILATING FAN DIVISION • ATLANTA, GA.

Let's face facts!

It's easier—and cheaper—to follow the leader than to pioneer products. Trail blazing of fittings for the electric light and power industry, for example, costs money. More money than many companies, eyeing their profit pictures, are willing to invest.

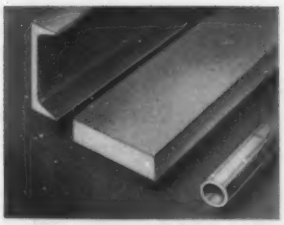
But, 55 years ago, when Alcoa started making aluminum accessories, there were none to copy. More than two million miles of transmission line depend on aluminum accessories today because of work we did. Thousands of heat runs at our research labs

ALCOA ON TV brings the world to your armchair with "SEE IT NOW" featuring Edward R. Murrow, Tuesday evenings on most CBS-TV stations.

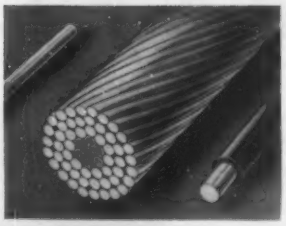


taught us the value of avoiding skimpy designs. Thousands of vibration tests at our physical testing labs taught us many basic design principles. Thousands of exposure tests on our own and customers' lines and at corrosion study centers taught us the importance of full recognition of the corrosion problem.

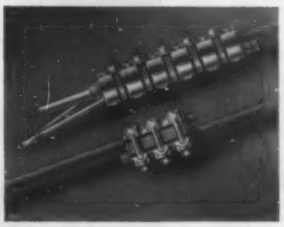
There is no substitute for Alcoa quality —you get just what you pay for. ALUMINUM COMPANY OF AMERICA, 2104-B Alcoa Building, Pittsburgh 19, Pennsylvania.



Alcoa® Aluminum Bus is available in rectangular and solid round bars, channels and tubular shapes.



Alcoa Aluminum Electrical Conductors include ACSR, solid and stranded aluminum wire, bare or covered.



Alcoa's full line of aluminum accessories is correctly designed for use with all aluminum conductors.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

News of the industry

edited for Southern readers

New SEWA officers assume duties

OFFICERS ELECTED to head the Southeastern Electrical Wholesalers Association for the calendar year 1954, assumed their duties immediately following the association's recent Fourth Industry Day meeting held at Atlanta's Biltmore Hotel.

The new officers are: B. F. Buchan, Southern States Supply Co., Inc., Charlotte, N. C., president; M. L. Tice, Atlanta, Ga., re-

Burton F. Buchan

elected executive vice-president; Ben S. Weil, Mayer Electric Supply Co., Inc., Birmingham, Ala., vice-president; and Fred H. Dendy, Sr., Electrical Wholesalers, Inc., Atlanta, Ga., re-elected treasurer.

The 1954 SEWA Board of Governors includes: Ralph W. Thurman, Thurman-Logan Electric Supply Co., Inc., Chattanooga, Tenn., governor-at-large; Ray R. Morgan, Sr., Morgan Electric Supply Co., Gadsden, Ala.; James E. Whitfield, McDonald Electric Co., Inc., Miami, Fla.; A. E. Marshall, Georgia Electric Supply Co., Augusta, Ga.; Joseph G. Hunt, Electric Supply, Inc., High Point, N. C.; Louis G. Sullivan, Sullivan Hardware Co., Anderson, S. C.; and Harry C. Conner, Summers Hardware & Supply Co., Johnson City, Tenn.

George Sins elected EANO '54 president

GEORGE F. SINS was elected 1954 president of the Electrical Association of New Orleans at this group's recent annual meeting.

In addition to Mr. Sins, the following association officers were named:

W. A. Barnes, executive vice-president; C. Espy Reed, vice-president, Wholesalers, utilities and manufacturers; W. H. Bramblett, vice-president, appliances; A. G. Siegel, vice-president, electrical contractors; Emmett A. Smith, vice-president, air conditioning and ventilation; Robert Schumert, vice-president, radio and television; W. E. Clement, director of publicity; E. H. Mowen, secretary; and I. W. Tufts, treasurer.

The executive committee elected for 1954 is composed of: W. P. Massey, E. N. Avegno, A. B. Paterson, Jr., E. J. Hemard, Jr., S. A. Greco, Frank Prattini, T. C. Lauck, J. N. Roos, Charles Pearson, Jr., and J. R. Guidroz, ex-officio.

Date set for annual Nashville electric show

NASHVILLE ELECTRIC Service and the Nashville Electrical Dealers Association, in co-operation with the various electrical dealers, distributors, and manufacturers, will again sponsor the city's annual electric show. The 1954 Nashville Electric Show dates have been set for Tuesday, May 11 through Friday, May 14. The location for the show will be the same as for the previous two years—the Electric Center Drive-Thru Garage, Church Street at 13th Avenue in Nashville.

The show committe is composed of J. R. Andrews, Sr., general chairman, Radio and Appliance Corp.; W. D. Hall, Nashville Electric Service; R. F. Linsert, Nashville Electric Service; William A. Meyers, Jr., B. F. Myers & Son; J. T. McGregor, Nashville Electric Service; and Orville White, White Appliance Company.

Use direct mail to sell group lamp replacement

TWO NEW DIRECT-MAIL campaigns to help Westinghouse dealers sell their labor-saving group replacement plan for fluorescent lamps were announced recently.

Under the new plans, Westinghouse will mail an explanatory letter, illustrated booklets and other factual matter about the

JOINT PROMOTION—W. B. Davis Electric Supply Co., Memphis distributor, recently teamed with Mott Electric Co., contracting firm, to advertise the installation of Meier electric wall furnaces in 700 new homes in a subdivision near Clarksville, Tenn.

Get into the heating business... and get repeat business !

USKON ceiling heating panels are quickly, easily applied to the ceiling. Minimum of time and bother.

When homeowner finishes his expansion attic or builds a game room, he orders more USKON panels from you. *Repeat* business!

U. S. Rubber's USKON® electrical radiant panels

USKON sheet panels are quickly and easily applied on the ceiling by any electrical contractor. No extensive wiring or alterations needed. The panels are *applied*, not embedded in the ceiling. A minimum of time and trouble for you. Costs stay at rock-bottom.

USKON is a proven seller. The homeowner knows he can heat his house as it grows: when he wants to finish his expansion attic he merely orders more Uskon panels from you. You get profitable repeat business!

Uskon is the heating system every homeowner wants. No radiators, no ducts, no hauling of ashes, no soot, no dirt. Heat goes on or off with just a flick of a switch or thermostat. Fits in with any decorative scheme, can be painted over with any ordinary flat paint.

USKON is a product of United States Rubber Company. It has been tried and proven for many years with complete success in homes, apartments, offices, commercial and industrial buildings, bathrooms, sun porches, game rooms, garages, basements, motels, summer cottages. It is approved by Underwriters' Laboratories, Inc.

Electrical contractors now handling Uskon find it is one of their most profitable, trouble-free items. Uskon has extended their market, and assured them of repeat business as well. For complete technical data and cost information, write for Catalog M-3177, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

US RUBBER

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

group replacement program, and a postpaid reply order card, to each of a group of prospects selected by the distributors.

Personalized reply cards are addressed to the respective distributors supplying lists. Distributors pay only actual postage charges, Westinghouse providing all material and mailing services.

The Westinghouse group replacement plan is designed to save the user a net of $27 in labor and lamp costs for every 150 fluorescent lamps changed.

Under the program, all lamps in a given installation are replaced at one time instead of haphazardly as burnouts occur. Eighty per cent of the replaced lamps are discarded and the best 20 per cent are saved.

As burnouts occur, they are replaced individually from the 20 per cent saved. When that supply is exhausted, the other lamps in the installation will have burned 80 per cent of their average life, at which time another group replacement is in order. Again the best 20 per cent are saved, the rest discarded, and the cycle repeated.

ANDERSON CATALOG—J. L. Howarth (right), general sales manager, Anderson Brass Works, Inc., Birmingham, Ala., presents the first complete copy of the company's new catalog to R. E. Schuler, Anderson president. The company believes this is one of the most comprehensive catalogs ever offered to the electrical industry. It has a permanent type cover binder, with separate loose-leaf product and specification sheets.

I-T-E Circuit Breaker acquires Chase-Shawmut

I-T-E CIRCUIT BREAKER Co., Philadelphia, Pa., manufacturer of electrical switchgear used in the electric power industry, has acquired a controlling interest in the Chase-Shawmut Co., Newburyport, Mass.

This acquisition further broadens I-T-E's participation in the electrical distribution field.

Chase-Shawmut has manufactured low-voltage fuses for over sixty years, and in recent years has developed a low-voltage, compact, current-limiting fuse distributed under the trade name "Amp-trap."

William S. Edsall will continue as president of Chase-Shawmut. P. G. Johnston has been elected vice-president; Laurence B. Cheney, treasurer; and David Greer, secretary.

Signal Electric realigns territories

SEVERAL CHANGES in Southern sales territories have been announced by Paul G. Glenkey, sales manager of the Signal Electric Manufacturing Co., Menominee, Mich.

W. H. Lassiter Sales Co., Charlotte, N. C., will now cover North Carolina and South Carolina. These two states were formerly covered by Hopper and McCoy, Atlanta, Ga.

W. H. Lassiter Sales Co., Richmond, Va., will add to their present territory of the State of Virginia, the District of Columbia and western Maryland. This territory was formerly covered by the H. R. Hopkins Co., Philadelphia.

S. M. McKenzie Sales Co., Cincinnati, Ohio, will add to their present territory of Kentucky and Southern Ohio the lower half of Indiana, South of Indianapolis. This portion of Indiana was formerly covered by the Tideman-Sprenger Co., Chicago.

Gillespie elected EAKC president

K. G. GILLESPIE was elected president of the Electric Association of Kansas City, Mo., recently at the 42nd annual meeting of that organization. Mr. Gillespie, vice-president and general manager of Jenkins Music Co., Kansas City, served the association as president during most of 1953, filling out the unexpired term of C. P. Haas of General Electric.

The newly-elected president has been active in activities of the Electric Association since 1929, and has served in various capacities. He has been a director, and for 10 years was a vice-president of the group in charge of the Wholesale Appliance Division. A year ago he was elected vice-president of the Dealer Division, and served in that capacity until he was named to fill the unexpired term as president.

Elected as vice-presidents of the various divisions of the Electric Association are: Utilities—M. A. Paulin, Kansas City Power & Light Co.; Manufacturers—R. R. Marvin, General Electric Lamp Division; Appliance Wholesalers — D. A. Smith, Superior Distributing Co.; Supply Wholesalers—R. B. Brownlee, Missouri Valley Electric Co.; Maintenance, Repair & Service—John E. Launder, Independent Electric Machinery Co.; Manufacturers Agents & Representatives—L. S. Gershon, L. S. Gershon & Son; Radio & TV Broadcasters—George J. Higgins, KMBC & KMBC-TV; Appliance Dealers — J. E. Sadewhite, Peck's; and, Electrical Contractors—C. F. Miles, Squire Electric Co.

C. M. Anderson, Apparatus Department of the General Electric Co., was re-elected secretary-treasurer of the association. John S. McDermott is executive manager of the group.

Oklahoma Utilities set convention date

OFFICERS ELECTED to serve the Oklahoma Utilities Association during 1954 are: President—Earl J. Newlin, president, State Fuel Supply Co., Oklahoma City; First Vice-President—Harry W. Pitzer, vice-president, Public Service Company of Oklahoma, Chickasha; Second Vice-President — H. C. Webb, vice-president, Oklahoma Natural Gas Co., Tulsa; and Treas-

ultra-shallow fluorescent luminaires from MITCHELL

The new ultra-shallow "Polaris" luminaire incorporates all the fine features described at right, with Penticore prismatic glass shielding delivering a light transmission factor of 85%, with excellent diffusing quality. The combination of high light output and the low surface brightness of the "Evenglo" sides and Penticore Glass shield creates ideal, harmonious lighting for the finest commercial interiors.

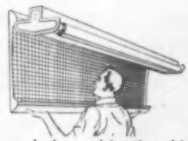
This is the new ultra-shallow luminaire designed to meet the requirements of large commercial installations where high-efficiency lighting and exceptional low cost are primary considerations. The luminaire features a V-spine design which provides a highly reflective surface to increase down-light intensity. The 8-foot units feature special "tandem" design (two 4-foot units with one 8-foot body channel) to save installation time and assure perfect alignment in continuous rows.

where quality counts—SPECIFY MITCHELL

Choice of 4 and 8 foot lengths in 2 and 4 lamp models — All lamp types available

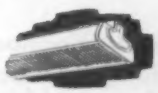
New "Thinline" answers the need for high-efficiency illumination, coupled with attractive styling. Outstanding advantages include: ultra-shallow contour provides pleasing, streamlined installation; special translucent "Evenglo" plastic sides and louver give higher light transmission, yet provide tremendous hiding power and diffusion for desirable low surface brightness; superior louver design with proper 45°/45° cutoff conceals lamps from all normal viewing angles. Advance styling, unusually low maintenance factor and high lighting efficiency make the new MITCHELL "Thinline" Luminaires outstanding values in commercial fluorescent lighting.

Note the ultra-shallow contour. When flush-mounted, the luminaire presents a beautiful streamlined appearance.



Concealed combination hinge and latch on each side of luminaire permit easy removal of louver from either side.

New Rapid-Start units are available; they slash maintenance cost by eliminating expense of replacing starters.



"Evenglo" translucent extruded Polystyrene side panels provide desirable uniform low surface brightness.

Write for complete descriptive brochures describing the new MITCHELL Ultra-Shallow "Thinline," "Polaris" and "Modernizer" Luminaires

MITCHELL MANUFACTURING CO.
2525 N. Clybourn Ave., Chicago 14, Ill., Dept. 8-B
In Canada: Mitchell Mfg. Co., Ltd., 19 Waterman Ave., Toronto

urer—H. H. Ferrin, vice-president and treasurer, Oklahoma Gas and Electric Co., Oklahoma City, Miss Kate A. Niblack, secretary of the group reports.

Harry W. Pitzer is chairman of the association's 1954 convention, which will be held March 25 and 26, 1954, in the Oklahoma Biltmore Hotel, Oklahoma City.

Frank Davis adds Trade-Wind Motorfans

FRANK B. DAVIS, P. O. Box 4745, Atlanta, Ga., manufacturers agent, has added the Trade-Wind Motorfans line. He will represent Trade-Wind in the states of Georgia, Alabama, Florida, North Carolina, South Carolina, and Eastern Tennessee.

Mr. Davis also handles Advance Insulated Wire & Cable in North Carolina, South Carolina, Georgia, Alabama and Florida; the Ericson Manufacturing Company line in South Carolina, Georgia, Alabama, Florida and Eastern Tennessee; Elliott Electric Products in Georgia and Alabama; and Western Insulated Wire in North Carolina, South Carolina, Georgia, Florida and Eastern Tennessee.

Frank B. Davis

Touch-Plate announces new plant construction

TOUCH-PLATE Mfg. Corp., Long Beach, Calif., manufacturers of remote control switching equipment electrical wiring systems, has announced the construction of a new plant and headquarters building.

The new building, which will include some 12,000 square feet of area, will enable the company to produce about three times its present volume. The building will be of the tilt-up concrete type construction.

Pyle-National buys two Adapti lines

PYLE - NATIONAL Co., Chicago, manufacturers of electrical and air - conditioning equipment for railroads and industry, has purchased the patterns, tools, dies, jigs, fixtures and inventory of two lines of electrical products from the Adapti Co., Cleveland, H. V. Engh, president of Pyle-National announced recently.

Pyle-National will manufacture and sell these products, consisting of conduit fittings and vaportight lighting fixtures, under the trade name of "Pylets."

G-E delivers first Rome built transformer

THE FIRST TRANSFORMER to roll off the production line of the General Electric Company's nearly-completed, 25-million-dollar plant in Rome, Ga., was officially delivered recently to the Georgia Power Company.

An 18-ton, 5,000-KVA, three-phase unit, it was also the first transformer of its size to be manufactured in the South. In a brief ceremony attended by officials of both companies, the transformer was started on its way to the power company's new Woodward Avenue sub-station in Atlanta.

"This transformer," said J. M. Oliver, vice-president and general manager of Georgia Power, "is only the first of hundreds that will roll out of this plant when production reaches capacity. It means that consumption of electricity will continue to increase in this area, bringing an ever better standard of living to Georgia and the South."

D. B. Lawton, manager of the huge new plant, said construction, which began in 1952, is expected to be completed in the spring of this year. Power transformers, rated 501 to 10,000 KVA and weighing from 4 to 30 tons each, will be manufactured with a new near-conveyor-type system. Some 1,700 to 1,800 eventually will be employed at the plant.

John Ager, Georgia manager of the G-E Apparatus Sales Division, Atlanta, said the new plant "is a good example of the industrial expansion now taking place in the South." He added that the expansion of power facilities here "will help to bring more manufacturers to the South and increase the productivity of existing plants."

Farquhar to handle Diehl motor line

FARQUHAR Machinery Co., Jacksonville, Fla., has been appointed a distributor for the Diehl line, including all types of single and three phase motors, electric grinders and Diehl-Lites.

Officers of the company are William E. Wahl, president; Allen B.

The first power transformer to be produced at G-E's nearly completed, 25-million dollar plant at Rome, Ga., is officially delivered to the first customer, the Georgia Power Company. Left to right are Harllee Branch, Georgia Power president; J. R. Carmichael, Georgia Power manager of purchases and stores; John C. Ager, Georgia manager of the G-E Apparatus Sales Division; and D. B. Lawton, manager of the Rome plant.

Meet all electrical "specs" with Youngstown Buckeye Conduit!

CONTRACTOR TELLS WHY HE'S FOR BUCKEYE: "When wiring homes, I refuse to take short cuts. That's why I use Youngstown Buckeye rigid steel conduit. That's the conduit approved for all types of building construction and occupancy—for tomorrow's demands as well as today's. Buckeye gives wiring complete protection. Home owners like to know that."

LISTEN TO THIS CONSULTING ELECTRICAL ENGINEER: "Only full weight standard threaded rigid steel conduit is approved by the Code as moisture, dust and explosion proof for use in hazardous locations. That's why I always specify Youngstown Buckeye conduit. In addition, I find that the strength and permanence of Buckeye conduit is appreciated by builders."

Youngstown manufactures full weight standard threaded rigid steel conduit from start to finish. This assures better steel and consistency of quality in manufacture. Only top grade steel gives complete long term protection. When you buy or specify Youngstown Buckeye conduit, you know you're meeting all construction requirements.

Shipments of Buckeye rigid steel conduit are now being made from our conduit mills at Indiana Harbor and Youngstown.

QUALITY · YOUNGSTOWN · SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices — Youngstown 1, Ohio

Export Office-500 Fifth Avenue, New York

COLD FINISHED CARBON AND ALLOY BARS · ELECTROLYTIC TIN PLATE · COKE TIN PLATE · WIRE · PIPE AND TUBULAR PRODUCTS · CONDUIT · RODS · SHEETS · PLATES · BARS · RAILROAD TRACK SPIKES.

Harden, vice-president; John G. Vaughn, sales manager; and John J. Wahl, purchasing agent. Farquhar has a staff of eleven salesmen.

Statesville lights up, uses most fluorescents

THE LARGEST single installation of fluorescent street lights in the United States was placed in operation at Statesville, N. C., recently.

The 104 General Electric fluorescent fixtures, described by Statesville's mayor, J. Garner Bagnal, as "the most modern street lighting in America today," are mounted throughout a major portion of the city's business district.

The six-foot-long luminaires provide approximately 4½ times as much light as the former fixtures while utilizing only half as many units, according to G-E engineers.

Statesville's 17,000 citizens turned out en masse to participate in and watch a parade that followed the official "lighting up" ceremonies, and addresses were made by city officials, including Mayor Bagnal and Dr. T. V. Goode, senior member of the city council.

This was followed by the crowning of "Miss Merry Christmas" and a community-wide street dance held under the new lights.

Mayor Bagnal said that the fluorescents are expected to attract new business to the Statesville shopping area, as well as add to the beauty and safety of the community.

During the ceremonies, C. J. Hendon, commercial vice-president of the General Electric Company, congratulated the citizens of Statesville for their progressive planning in making their city a showplace of modern street lighting.

The installation was made by the Statesville Electrical Department.

Sheldon Electric names Southern sales agent

SHELDON ELECTRIC Co., Irvington, N. J., has announced the appointment of Electronic Equipment Sales Agency, 418 Wilder Building, Charlotte, N. C., as their sales representatives for North Carolina, South Carolina, Virginia and Tennessee.

Electronic Equipment Sales Agency is headed by Harold A. Loring, well known through the South as former district television supervisor for Westinghouse Electric Supply Company. Mr. Loring will personally supervise representation for the full line of products manufactured by Sheldon Electric Co., and its parent firm, Allied Electric Products, Inc., including TV picture tubes, receiving

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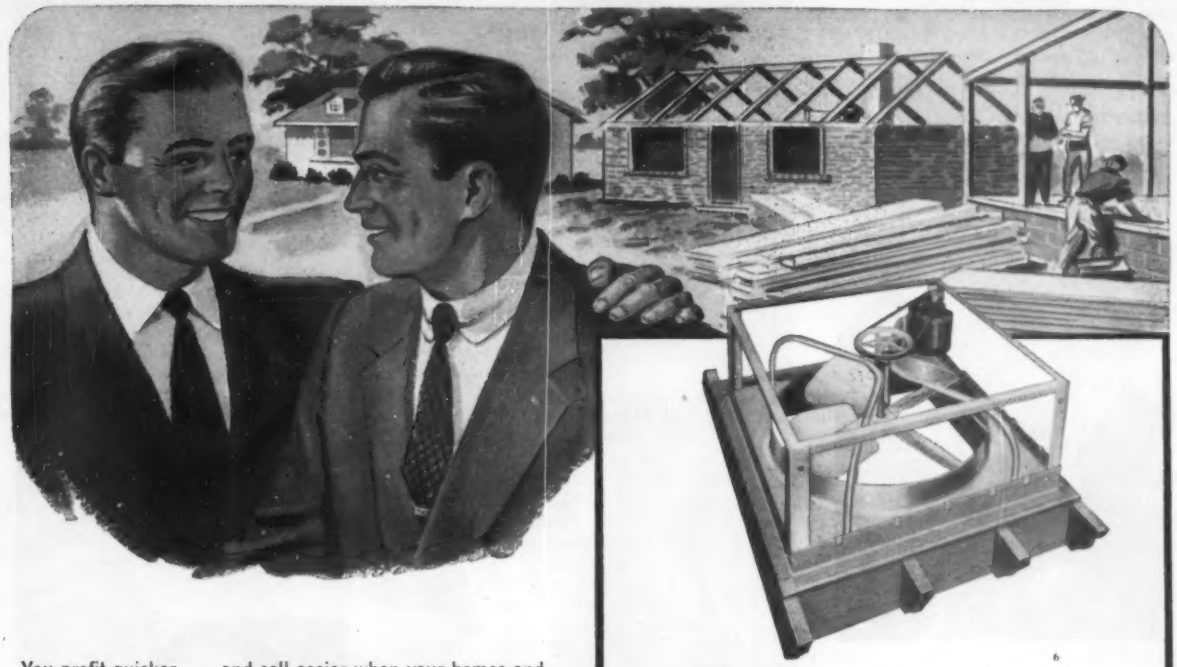
LIGHTING WINNER—This gaily-decorated building is the home of Williers Electric Co., electrical contractors, 106 S. MacDill Ave., Tampa, Fla., which was the Commercial Division winner in the Brighten Up Tampa Contest. The Williers firm always enjoys a good volume of Christmas lighting business, and this proves that they are well qualified for such jobs.

LAU *1954 Fan Facts*

Try this LOW-COST way to make more friends and profits for your business!

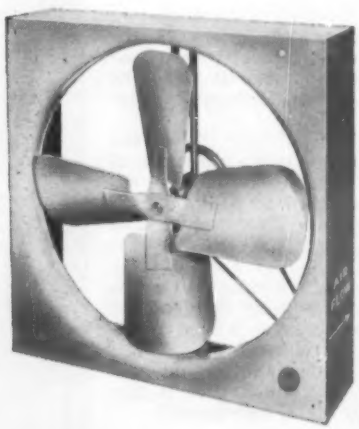


You profit quicker . . . and sell easier when your homes and buildings feature "built-in extras" that add so much to the comfort and convenience of the buyer.

Make friends and customers of your prospects by installing LAU "Niteair" cooling. Just a flip of the switch and these superior fans send gentle, cooling, refreshing breezes flowing through the home. Hot, stagnant air is quickly expelled.

Quick . . . easy . . . and economical to install. LAU "Niteair" Fans make friends and really JUMP profits for you. Plan to install the tested, proven LAU "Niteair" now!

LAU "Niteair" Rancher Fans. Designed for homes with low-pitched roofs. Available in four sizes—24", 30", 36" and 42", with air delivery to meet every demand.



LAU "Niteair" Panel Units. Newly designed, ruggedly constructed. Discharge capacity for every requirement. Five sizes—24", 30", 36", 42" and 48".

Certified Ratings — PFMA — UL

Guaranteed 5 years

Lau fan ratings are Certified by the PFMA and carry UL approval. Fans are guaranteed for 5 years and motors carry a one-year warranty.

THE LAU BLOWER COMPANY, 2019 Home Avenue • Dayton 7, Ohio
Write today for catalogs and further information.

tubes, AC line boosters, Visulators, fluorescent lamp starters, Spring-Action plugs, Tapmaster extension cord sets, and other television and electronic accessory items.

Sylvania receives 'best fixture' award

B. K. WICKSTRUM, vice-president and director of sales of Sylvania Electric Products, Inc., recently accepted a plaque awarded to Sylvania for the "best designed industrial lighting fixture." Making the presentation was Morris Lapidus, head of the committee of judges composed of distinguished members of the New York Chapter of the American Institute of Architects. Judging took place at the Second National Electrical Industries Show sponsored by the Eastern Electrical Wholesalers Association.

B. K. Wickstrum (left) accepts Electrical Industries Show's fixture award plaque for Sylvania from Morris Lapidus, head of judges.

The fixture winning the award was one of Sylvania's new line of Industrial-Commercial fixtures especially designed to provide high levels of quality illumination. The award winning fixture, the IC-2905, is a five-foot fixture, with 42-degree side shielding and without louvers, making it ideal for high mounting areas where maintenance is a problem.

A plastic side panel model won the award, but the fixture is also available in metal side panels.

Smithcraft doubles production area

ANNOUNCEMENT is made by J. J. Smith, president of the A. L. Smith Iron Co., of Chelsea, Mass., of the purchase of 175,000 additional square feet of floor space for the Smithcraft Lighting Division of the company. The acquisition of this property more than doubles existing plant space.

The buildings, located in Chelsea adjacent to the present plant, will be used by the Smithcraft Lighting Division in the development of a long-range expansion of the company's manufacturing facilities.

Advance Transformer moves into new home

ADVANCE TRANSFORMER Co., Chicago, is now in its newly erected building at 2950 North Western Ave., it was announced by Louis R. Duman, president. Mr. Duman stated that the move was made gradually, so that there would be no interference with either production or shipping during the trans-

R. P. Smith named publishing president; W. J. Rooke elevated to board chairman

AFTER MORE than 40 years of service with the W.R.C. Smith Publishing Co., the last 17 as president, William J. Rooke has been elevated to the position of chairman of the board, and Richard P. Smith has been elected president to succeed him. The action was taken by the company's board of directors at their annual meeting held in January.

The W.R.C. Smith Publishing Company are publishers of ELECTRICAL SOUTH, *Southern Appliances*, and five other business and industrial magazines.

Mr. Rooke had served as business manager of several of the company's publications, and in 1931 was made executive vice-president. In 1937, he was elected president to succeed W.R.C. Smith, founder and first president of the company.

William J. Rooke

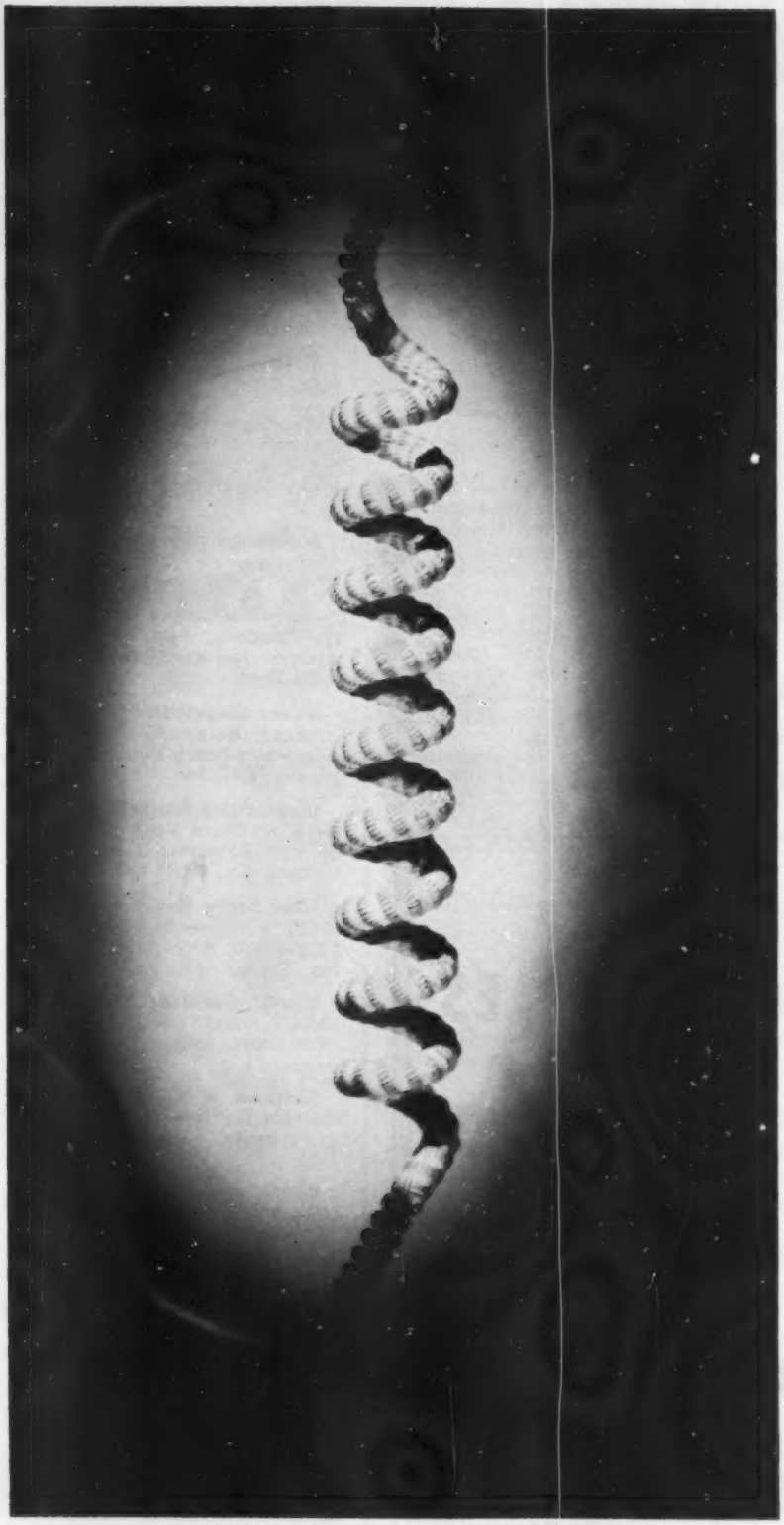
Mr. Rooke is a past president of the Associated Business Publications, and is currently vice-chairman of the National Business Publications, Inc. He is vice-president of the Atlanta Chamber of Commerce and a director of the Bank of Georgia. Mr. Rooke is a Phi Beta Kappa graduate of Western Reserve University, Cleveland, Ohio.

Mr. Smith, the newly-elected president of the company, has been associated with the company since 1934. He has served the company in various capacities, including business manager of *Textile Industries*, and sales promotion manager. He was elected vice-president in 1940 and then advanced to the position of executive vice-president in 1946.

Mr. Smith was educated in Atlanta public Schools before going to Cheshire Academy, Connecticut. He graduated from Virginia Military Institute in 1934. During World War II he served with the United States Army, attaining the rank of Lieutenant Colonel, Field Artillery.

Richard P. Smith

Mr. Smith has been particularly active in civic affairs and at the present time is chairman of the board of the Rotary Club of Atlanta. He is a director of the Atlanta Child's Home, Business Publications Audit, Inc., and a trustee of the Youth Service Fund, Inc., and the Rotary Educational Foundation, Inc.



New twist on old idea makes G-E fluorescent lamps last longer

ONE of the most important materials in a fluorescent lamp is the little bit of chemical at each end of the tube. The current flows through it, electrons flow out, and the lamp starts to glow.

The old idea was to hold the chemical on a double-twisted wire coil. General Electric's new idea was to go that one better: give the wire a *triple* twist. This not only holds more chemical, it also holds it longer.

The result of course is longer lamp life and more light for your money.

General Electric's triple coil is used in G-E slimline and other G-E instant-start lamps. Just one more example of why...

You can expect the best value from General Electric fluorescent lamps

You can put your confidence in—

GENERAL ELECTRIC

fer. Much new and improved equipment has been added, he revealed.

The plant, a one story structure, provides 100,000 sq. feet of manufacturing floor space, and incorporates seven inside loading and unloading docks.

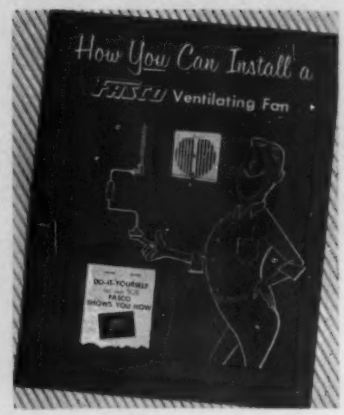
Fasco announces new 'do-it-yourself' plan

A COMPLETELY new plan for marketing Fasco ventilating fans was announced recently by C. W. McLaughlin, sales manager of Fasco Industries, Inc., Rochester, N. Y.

Designed to tie-in with the powerful "Do-It-Yourself" trend, the plan is built around a colorful 16-page copyrighted book pictorially describing to consumers how they can easily install an eight or 10-inch Fasco ventilating fan.

The program will be backed by extensive national advertising in leading magazines. The books will be sent directly to interested consumers from Fasco, and all inquiries will be sent directly to participating Fasco dealers in the areas from which the inquiries originate.

To participate, dealers buy three



Fasco ventilating fans of their choice. They receive in return displays, books, counter cards, streamers, advertising mats, radio commercials, direct mail letters, other sales aids and names of customers receiving the book.

Included in each book mailed is a certificate for a nationally advertised home handyman instrument to make the installation still easier. This premium may be obtained only from participating Fasco dealers. The purpose of the premium is to bring customers into the store.

Dates Ahead

National Adequate Wiring Bureau, Tenth Annual Conference, La Salle Hotel, Chicago, Ill., Feb. 25-26, 1954.

Southeastern Electric Exchange, General Conference, Boca Raton Hotel and Club, Boca Raton, Fla., Mar. 22-24, 1954.

Southern Homes Show, first annual affair, Textile Hall, Greenville, S. C., Mar. 22-26, 1954.

Oklahoma Utilities Association, Annual Convention, Oklahoma Biltmore Hotel, Oklahoma City, Okla., March 25 and 26, 1954.

Mississippi Chapter, IAEI, annual meeting, April 1-2, 1954. (Place to be announced.)

Tennessee Chapter, IAEI, annual meeting, April 5-6, 1954. Andrew Jackson Hotel, Nashville, Tenn.

Edison Electric Institute, 20th Annual Sales Conference, Edgewater Beach Hotel, Chicaga, Ill., April 5-8.

Illuminating Engineering Society, Southern Regional Conference, Roosevelt Hotel, New Orleans, La., April 8-9, 1954.

Illuminating Engineering Society, Southwestern Regional Conference, Rice Hotel, Houston, Texas, April 11-13, 1954.

North Carolina Chapter, IAEI, annual meeting, April 13-14, 1954. (Place to be announced.)

Southern Textile Conference, Georgia Institute of Technology, Atlanta, Ga., Apr. 15-16, 1954.

South Carolina Chapter, IAEI, annual meeting, April 15-16, 1954. (Place to be announced.)

Georgia Chapter, IAEI, annual meeting, April 19-20, 1954, Griffin, Ga.

Alabama Chapter, IAEI, annual meeting, April 22-23, 1954. (Place to be announced.)

7th Annual Conference for Protective Relay Engineers, A & M College of Texas, College Station, Texas, April 26-28, 1954. Conference chairman, L. M. Haupt, c/o A & M College.

Southeastern Electric Exchange, Engineering and Operation Section, Sans Souci Hotel, Miami, Fla., May 6-7, 1954.

CABLE
NOB-STAPLES

EMT-CONDUIT
and
SERVICE CABLE
STRAPS

BEST BUY
ALL WAYS

W. W. CROSS & CO., INC. – JAFFREY, N. H.
GENERAL SALES AGENT
J. J. WALSH & CO. - GREENVILLE, R. I.

the finest INSIDE OUTSIDE decorative light on the market

... Available Through Your KILLARK Distributor

THE NEW **KILLARK** *Dekorative Light*

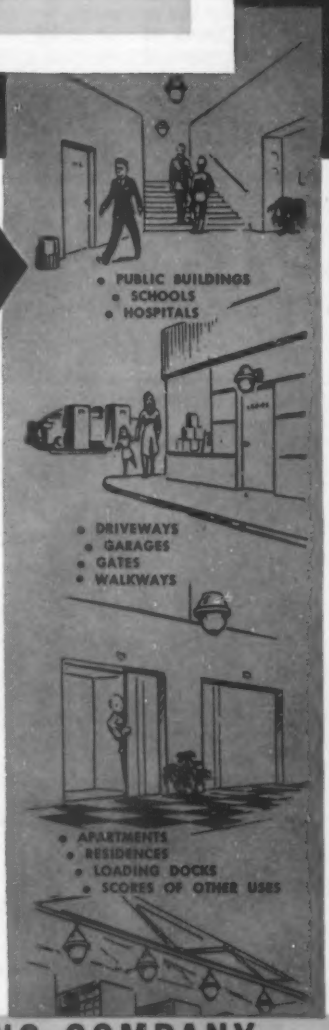
Choice of 3 Styles:

BRACKET (shown above)

PENDANT **CEILING**

Easily Relamped Without Tools

YOU SEE THEM EVERYWHERE



HANDSOME, FUNCTIONAL DESIGN

Perfect for industrial, public and residential applications where ordinary vapor-proof fixtures may be considered too plain or unattractive. Smooth, modern lines . . . easy-to-clean design . . . non-staining satin-like Alumalloy that will retain its "just installed" look for years and years.

STURDY CONSTRUCTION FEATURES

Install it, forget it! Constructed throughout of non-rusting, non-corroding Alumalloy . . . strong, smooth, lightweight. Protected from all kinds of weather by Neoprene Gasket Seal.

K KILLARK ST. LOUIS *Killark*

ELECTRIC MANUFACTURING COMPANY

ENTRANCE FITTINGS • CONDUIT BODIES • FLUSH SWITCH FITTINGS • EXPLOSION-PROOF FITTINGS • VAPOR-TIGHT LIGHT FIXTURES • EXPLOSION-PROOF LIGHT FIXTURES • SEALED BEAM FIXTURES

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SALES OFFICES and WAREHOUSE STOCKS	Atlanta	69 Mills Street, N. W.	Dallas	1901 Griffin Street	Philadelphia	2014 Chancellor St.
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Free bulletins

available to our readers

A 4-page **lighting catalog** designed for quick reference has been compiled by **Electro Silv-A-King Corporation.** The catalog has illustrations, specifications and lighting patterns of a representative line of the firm's commercial and industrial fluorescent fixtures as well as industrial incandescent and floodlight units.

Included in the catalog are the new Electro Silv-A-King "20/20" fluorescent and slimline fixtures and the new RLM-approved 25 per cent up light industrial fixtures, designed to meet the increasing request for higher levels of more efficient lighting in all types of industrial plants.

Copies of the condensed catalog are available by writing to Electro Silv-A-King Corp., 2000 W. Fulton St., Chicago 12, Ill.

The new 1954 edition of the **Alden Products Company** handbook, "Ideas-Techniques-Designs" is packed with new standard components for unitizing electronic equipment. It provides new data and planning sheets on plug-in packages and basic chassis for unitizing equipment and giving it 30-second interchangeability.

Further improvements and newer components for indicating and monitoring operating of electronic equipment with tiny tell-tales are described. New models of connectors and interconnecting systems that allow dynamic color-coding for easy circuit tracing have been added.

The booklet is available to manufacturers and designers writing on their letterhead to Dept. HB, Alden Products Co., Brockton, Mass.

A new 52 page catalog illustrating over 1400 **electrical wiring devices,** lamps and specialty products has just been issued by **Eagle Electric Mfg. Co., Inc.,** 23-10 Bridge Plaza South, Long Island City 1, N. Y.

Showing the largest and most complete line in its over 30 years, Eagle has added many new products this year. Included among these is a complete line of interchange devices which are interchangeable with all standard lines. Also new are a line of caps and connectors with cord clamps, several different types of extension cords, and a variety of new style and colors of desk and bed lamps.

Profusely illustrated with full information, this new catalog is designed to serve as a selling device as well as a reference book for the trade. All products are cross-indexed to facilitate quick and easy finding.

Among the 1400 quality electrical items featured are: electrical wiring devices, extension and cord sets, fuses, lamps, wall plates, push buttons, range cords and outlets, cigar lighters and elements, nichrome wire and elements and staples.

The catalog is available on request to the company.

An eight-page booklet describing and discussing Acusti-Luminous ceilings has been issued by **Luminous Ceilings, Inc.,** 2500 W. North Ave., Chicago 47, Ill. Details are given in the discussion to the technical aspects of the ceilings concerning the acoustical and lighting advantages in using the material.

Two new four-page bulletins on **multiple-circuit photo-electric control equipment** for outdoor lighting, and particularly street lighting, are now available from the **General Electric Co.,** Schenectady 5, N. Y.

One bulletin, designated GEC-1210, contains detailed technical data on the equipment. This includes features and specifications, and information on installation and operation.

The second bulletin, GEA-5141B, provides information on various outdoor lighting applications for the new equipment. Data pertaining to its interchangeability and operational features is included.

"Transite Ducts" is a new 12-page brochure just issued by **Johns-Manville.** It covers installation and maintenance information on Transite Conduit (for exposed work and installation underground without concrete encasement) and Transite Korduct (for installation in concrete).

Fully illustrated, the brochure cites many typical examples from public utilities, telephone companies and other industries which show how Transite duct materials can cut cable subway costs.

Copies of Transite Ducts are available from Johns-Manville, 22 East 40th Street, New York 16, N. Y.

Fans and Blowers. Bulletin SDA-160, recently issued by **Peerless Electric Co.,** Warren, Ohio, describes the exhaust, ventilating, and industrial fans, utility blowers, pressure blowers, and blower-filter package units, commercial and industrial penthouses, and automatic louvers manu-

DO THE BEST JOB WITH
TOMIC
CABLE
CONNECTORS!
No. 100 Romex Connector for ½" K. O.
No. 200 Service Entrance and Range Connector for ¾" K. O.
PRICED RIGHT— You Can SAVE
PATENT NOS. 2097695 2419426
UNDERWRITERS' APPROVED
SIMPLE – slips in from outside.
QUICK – installed in 10 seconds.
CONVENIENT – for securing contacts.
DEPENDABLE – can not shake loose.
On Sale at Your Wholesaler
Manufacturer of Famous Tomic Thinwall Connectors and Couplings
Tomic Sales & Engineering Co.
20000 Sherwood Ave. Detroit 34, Michigan

You wouldn't buy a suit of clothes from a picture or a catalogue. You *look* at the material... *feel* the quality...

This man is *feeling* the better value in a Day-Brite LUVEX® lighting fixture. There's no other way he can *know* how much extra strength, what greater ease of installation he'll get with LUVEX interlocked louvers—just one of many LUVEX features.

HOW TO PROTECT YOURSELF

when you buy and install lighting fixtures

Buy lighting fixtures like you buy a suit of clothes. Look at them yourself . . . *feel* the value . . . *feel* the quality . . . *feel* the difference you can't always find in the catalogues.

Pictures, catalogs and sales stories are excellent ways to bring competitive lines of lighting fixtures to your attention.

But when you're ready to buy for a lighting job, *don't make a decision until you handle the fixtures yourself.* Don't buy until you're satisfied by your own inspection which fixture is *your* best profit producer.

We expect you to test the LUVEX or any other Day-Brite fixture in exactly that way. We know from experience your own judgment is the very best Day-Brite sales story we have.

410

LOOK AT THE LUVEX®
... FEEL THE DIFFERENCE
... BEFORE YOU BUY!

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5435 Bulwer Ave., St. Louis 7, Missouri.
In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

YOU'LL FIND THE DAY-BRITE REPRESENTATIVE IN YOUR AREA HELPFUL AND COOPERATIVE

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Ruff & Cannon
P. O. Box 1304

MARYLAND, BALTIMORE 17
Sam Masland
625 West North Avenue

N. CAROLINA, CHARLOTTE 2
Gordon Wells
212 Builders Bldg.

FLORIDA, SOUTH MIAMI
James A. Foerster
5991 S. W. 81st Street

TEXAS, DALLAS 2
H. A. Auchter
102 Thomas Bldg.

TEXAS, HOUSTON 6
N. O. Reed
1602 West Main Street

TEXAS, LUBBOCK
Stewart O. Norris
P. O. Box 446

FLORIDA, MANDARIN
Joseph N. Crevasse
P. O. Drawer 7

TENNESSEE, MEMPHIS 3
Munding Elec. Sales Agency
c/o Builders Exch.
166 Monroe Ave.

LOUISIANA, NEW ORLEANS 12
Paul Hogan, Jr.
342 International Trade Mart
Camp & Cammon Streets

VIRGINIA, RICHMOND 24
Earl Dagenhardt
4000 Maury St.

America's golfers have learned to beware of tight-fitting clothing that hinders movement, shortens drives, causes annoyance while putting.

FORE! HEADS UP! LOOK OUT!

BRONCO 60 Certified

—like today's golfer—wears an outer protective covering which permits free movement. Vulcanized by a unique modern process, Certified portable cords and cables are never subjected to high molding pressures which might tend to constrict movement of the finished cable. Components are free to move slightly in relation to each other. The Bronco method gives you a cable with superior flexibility and resilience. Cable life is lengthened because internal friction is less. Bronco 60 Certified "gives" under impact and crushing like a super-balloon tire. With a branded jacket certified to contain not less than 60% by weight of Neoprene, and with super-aging Cold Rubber insulation, Bronco 60 Certified is certainly your best buy.

BRONCO 60 CERTIFIED IS AN ACHIEVEMENT OF WESTERN INSULATED WIRE CO.

Los Angeles 58, California, and is sold nationally only through Electrical Wholesale Distributors.

factured by the Peerless company. The 14-page brochure discusses features of the line, and gives specifications for their use.

Valley Fan Manufacturing Co., Fort Valley, Ga., has announced publication of their Catalogue No. 60, which lists the company's complete line of **fans for home and industry** in 1954. The catalogue is well illustrated and gives sizes, specifications, and shipping weights on all Valley fans and ceiling and wall shutters. Copies are available from the company upon request.

An attractively-designed eight-page "pony catalog" has been issued by **Smithcraft Lighting Division,** 233 Everett Ave., Chelsea, Mass., copies of which are available upon request.

Containing condensed, but complete, information on Smithcraft's "Area Illumination," **commercial and industrial fluorescent fixtures,** and troffers, the profusely-illustrated catalog is actually an excelent "cross-index" of fluorescent lighting.

Rome Cable Corp., Rome, N. Y., has announced the publication of a new bulletin, RS-5, which is available to electrical contractors, utilities, and other cable users, upon request.

This bulletin contains specifications, physical data, and sag and tension data on **triplex service drop** and secondary cable, both copper and aluminum conductors, and with either Neoprene (polychloroprene) or polyethylene insulation. The company states that they believe this to be the first such bulletin issued by any cable manufacturer.

An up-to-date revision of the booklet which describes the Smithcraft Director has been released by **Smithcraft Lighting Division,** 233 Everett Ave., Chelsea, Mass. This eight-page booklet contains both technical and descriptive information about this outstanding **fluorescent lighting fixture,** as well as many actual photographs of installations. Copies are available upon request to the company.

The new all-electric **heat pump** is described in a four-page bulletin available from the **Westinghouse Electric Corp.,** Air Conditioning Div., Dept. T-557, 200 Readville St., Hyde Park, Boston 36, Mass.

The heat pump is the completely self-contained system that—without water or flame—provides warm filtered air in the winter and cool, dehumidified air in the summer.

A complete explanation of the heating and cooling cycles of the unit is presented in the bulletin including

schematic flow diagrams of the refrigerant and air.

Each of the many new feautres of the heat pump is described such as the elimination of flame-type fuels, water connections and the usual seasonal adjustments and maintenance.

Use of existing ductwork is discussed as well as possible locations in the home of either the three or five horsepower unit.

Preprints of **The F. W. Wakefield Brass Co.'s** eight page section on lighting which will appear in the 1954 Sweets' Catalog are available on request to Wakefield, Vermilion, Ohio. Descriptions of eleven major types of **lighting equipment** are supplemented by structural drawings and illumination data, including quick computation formulas for the company's several types of translucent ceilings. Some facts on acoustical effectiveness of Wakefield baffles and use of plenums as air diffusers are included.

The Adalet Manufacturing Co., 14300 Lorain Ave., Cleveland 11, Ohio, has anounced their Bulletin Print No. 154, which contains descriptions and prices on their new line of large size **flexible conduit connectors.** Copies of this bulletin are available from the manufacturer upon request.

Principal industrial electric heating applications and methods are described in a new 32-page booklet, "101 Ways to Apply Electric Heat," by **Edwin L. Wiegand Co.,** 7600 Thomas Blvd., Pittsburgh 8, Pa., manufacturers of Chromalox electric heating units. Copies are free upon request.

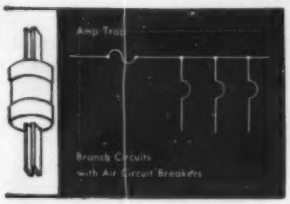
Illustrated case histories show experience-tested ways to apply metal-sheathed electric heating units in myriad industrial jobs. Physical aspects of installation are shown along with a description of the problem, solution and advantages obtained. Some of the heating jobs illustrated could not be done with any fuel except electricity—just as no other heat can match the job done by electric blankets.

Feedrail Corp., 125 Barclay St., New York 7, N. Y. has issued a 28-page bulletin (No. 35) cataloging their new design **heavy duty trolley busway electrical distribution systems.** The bulletin illustrates and describes the 225, 375 and 500 ampere systems for electrification of heavy duty cranes and hoists, machine tools, conveyor assembly lines or other moving equipment that must be powered. Sectionalizing of the bulletin makes easy the selection of equipment by those who plan and

Amp-trap®

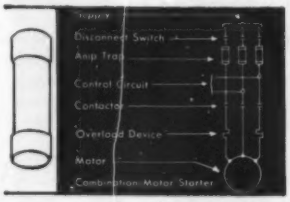
CHOPS DANGEROUS SHORT-CIRCUITS DOWN TO SIZE

Amp-trap with CIRCUIT-BREAKERS



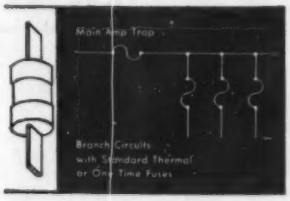
Amp-trap's lightning fast current limiting action makes it ideal for use in locations where the available short circuit current exceeds the circuit breaker's interrupting rating. It gives back-up, short-circuit protection to overload devices and clears a heavy short-circuit before the circuit breaker can open. Yet, the circuit breaker will open within its rating without blowing the Amp-trap.

Amp-trap with MOTOR CONTROLLERS



Amp-trap's small "let-through" current (low I^2t) gives positive protection to over current devices and contacts against high thermal or magnetic stress caused by super currents as high as 100,000 amperes R.M.S. at rated voltage. Amp-trap's operating characteristics limit stress on motor controllers, conductors, panel boards and load centers.

Amp-trap with PLUG-IN BUSWAY



Amp-trap's fast "chop-off" on high amperage short-circuit gives short-circuit protection to ordinary fuses and to isolate branch circuits without affecting feeder circuits or other branches supplied from the main busway. Actual tests on high short-circuit current have shown how Amp-trap amplifies plug-in busway momentary ratings by limiting magnetic and thermal stresses, and permits application of designs having limited withstanding ability on high powered installations.

Amp-trap is safe, efficient, economical short-circuit protection for electrical apparatus against large available short-circuit currents.

AMP-TRAP — "Awake At The Switch"

In Canada — Powerlite Devices, LTD.

THE CHASE-SHAWMUT CO.

382 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

specify electrical distribution systems. There are special sections on installation planning and procedure, methods of mounting and typical installations in addition to the equipment descriptions.

The 1954 edition of the **G-E Instrument Transformer Buyer's Guide**, containnig basic, up-to-date information on the complete **General Electric** line, has been announced as available from the company at Schenectady 5, N. Y.

The fully illustrated, 96-page publication, GEA-4626G, contains ratings, ASA accuracy classifications, and prices of all G-E indoor and outdoor potential and current transformers. Listings of ratio and phase-angle tests, together with tables covering the mechanical and thermal limits of current transformers, are included.

A four-page, fully illustrated bulletin, Folio R-54, offering full descriptions on a wide range of **reflector type lighting fixtures** for fluorescent and slimline lamps has been announced by **Gruber Lighting**, 125 S. First St., Brooklyn 11, N. Y. Eight basic units are shown, with detailed specifications, application notes and installation data.

Both one- and two-light models are covered, including 20- and 40-watt sizes, 25 inches and 49 inches long. Dimensioned construction sketches of each type are presented. Units shown are either open, louver-shielded or equipped with Alba-Lite diffusers.

An eight-page technical data booklet on **current and potential transductor magnetic amplifiers** is available from the **Westinghouse Electric Corporation.**

Transductor magnetic amplifiers have been developed for instrumentation, metering, and control of d-c currents and voltages requiring isolation.

A section covering application specifications is included to establish terminology for the operating characteristics. This information specifies the conditions necessary for proper operation and, in general, explains the effect of deviations from the specified conditions. Complete operating characteristics, including graphs showing rated control current versus output current of three transductor Magamps, are tabulated for easy reference.

For a copy of this booklet, TD 52-601, write Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Booklets discussed above may be obtained by writing directly to the manufacturers' addresses as given.

Technical books

for the electrical man

Magnetic-Amplifier Circuits

By William A. Geyger, McGraw-Hill's Book Information Service, 327 W. 41st St., New York 36, N. Y., $6.00.

Modern developments in magnetic-amplifier circuit techniques form the subject matter for this new book, which takes up the fundamental principles, characteristics, and applications of the magnetic-amplifier type of circuit. Particular emphasis is given to those circuit arrangements which have proved to be most useful in solving various problems in the field of instrumentation and in automatic-control systems.

In addition to surveying these circuit arrangements, this book offers detailed information concerned with design considerations, the testing of magnetic-amplifier components, and the practical applications of push-pull circuits, as used in many types of flux-gate magnetometers and high-performance servomechanisms.

Of significant value to circuit designers is the book's complete Subject-Index. It serves not only as a working guide to the book itself, but also to the numerous publications and patents listed in the references of each chapter. These references cover the abundant literature published in the last 50 years on saturable-core reactor devices and magnetic amplifiers.

Dr. Geyger is associated with the U. S. Naval Ordnance Laboratory, Magnetics Division, at White Oak Silver Springs, Maryland. He has published more than 100 papers in the field of Electrical Measurements and is recognized, both in this country and abroad, as one of the early pioneers in the magnetic-amplifier art.

News about people

H. P. Whitehead, assistant operating manager of **Georgia Power Co.**, has been named operating manager, according to an announcement from **Harllee Branch Jr.**, president.

A. H. Wade, superintendent of system operation, succeeds Mr. Whitehead as assistant operating manager. **R. J. Cooper**, protection engineer for the company, takes on the duties being relinquished by Mr. Wade.

A native of Maryland and graduate of Carnegie Institute of Technology, Mr. Whitehead has been with Georgia Power since 1929 and has served in several capacities.

Mr. Wade, a Georgia Tech graduate, joined the company in 1936, and Mr. Cooper, who received his degree from Alabama Polytechnic Institute, has been with Georgia Power since 1925.

The following organizational changes were recently announced by **Southern States Equipment Corp.**, Hampton, Ga.

Glenn Mitchell has been elected to the office of vice-president for manufacturing. Mr. Mitchell, formerly production manager, is now in charge of all manufacturing activities, including the stores department and maintenance of all plant properties.

T. A. Burdeshaw has been promoted to the position of engineering manager. He now has full responsibility for all engineering activities of the company. Mr. Burdeshaw was formerly sales manager for the electrical division.

T. E. Curtis and **J. P. Hansen** will continue in their present capacities as chief engineers for the electrical and mechanical divisions, respectively.

J. E. Cordell, formerly assistant sales manager for the electrical division was promoted to the position of sales manager, electrical division, assuming the responsibilities and duties formerly carried by Mr. Burdeshaw.

R. B. Sayre has been elected a vice-president of the **Graybar Electric Co.**, **W. E. Henges**, president, has announced.

Mr. Sayre started as a warehouseman at Memphis, Tenn., in 1921. Two years later he became supply salesman at Memphis, traveling the country territory of northern Mississippi, western Tennessee, Arkansas, Southeastern Missouri and western Kentucky for more than 16 years.

In 1939 he was appointed manager of the Outside Construction Depart-

ment of the Southern District, with supervision of the district's sales of outside construction materials at headquarters at Atlanta and at the district's branch locations at Birmingham, Columbia, Knoxville, and Chattanooga.

He returned to Memphis in 1943 as manager, and in 1948 he was appointed Peninsular District Manager at Jacksonville, Fla. In 1952 he moved to New York as assistant vice-president.

Mr. Sayre was recently elected to the executive committee of the National Association of Electrical Distributors.

Sales Manager **Frank Gibbons** of the **Viking Air Conditioning Division of The National Radiator Com-**

W. B. Eckenhoff

pany has announced the appointment of **W. Benjamin Eckenhoff** to the Viking sales staff. He will represent the company in Delaware, Maryland and Washington, D. C.

Lewis W. Reynolds, 2957 Hardman Ct., N. E., Atlanta, Ga., has formed a manufacturers' agency specializing in electronics, power tools and wiring devices. He was formerly Southern regional sales manager for Capehart-Farnsworth television.

Mr. Reynolds has been named sales representative for **Scott Radio Laboratories, Inc.,** Chicago, to handle their television, radio and phonograph lines in Georgia and Alabama. He also has been named representative for **Portable Electric Tools, Inc.,** Chicago, for Georgia, Alabama and Mississippi, and for **Candace, Inc.,** Chicago, manufacturer of Snug-A-Bed.

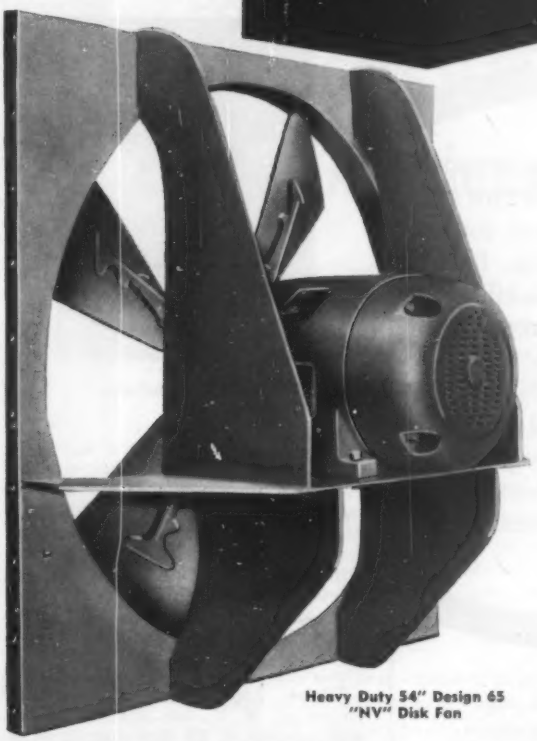
A native of Birmingham, Ala., Mr. Reynolds has lived in Atlanta for the past 12 years.

Line Material Co., Milwaukee 1, Wis., has appointed **John S. Macferran** fibre products sales engineer in the company's two southern divisions. Mr. Macferran is a specialist in the

"Buffalo" FANS

NEW

Efficient, Easily Installed PROPELLER FANS for Factory Ventilation!



Heavy Duty 54" Design 65 "NV" Disk Fan

New NV-BREEZO Line In Size Range Up To 84 Inches, Or 90,000 CFM

These new, larger "Buffalo" Package Units are specifically designed to solve practically any factory ventilating problem. Often, they can handle jobs that formerly called for much more expensive units. And, they provide steady performance with minimum power pull, either on free air delivery or against pressures of up to 1". Special models for high temperature and/or corrosive fume applications.

Direct or V-belt types available, in sizes from 24" to 84", or from 4,000 to 90,000 CFM. They're huskily built in the "Buffalo" tradition for long-run performance with practically no maintenance. Get FULL DETAILS TODAY on this new line of "Buffalo" Breezo Fans. You can cash in on sizeable profits by recommending them. Write now.

Send NOW for Complete Data on New "Buffalo" "NV" Propeller Fans

BUFFALO FORGE COMPANY

210 Mortimer Street Buffalo, New York

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representative in all Principal Cities

PANEL BREEZO FANS
BREEZ-AIR ATTIC FANS
BELTED VENT SETS
"L" BREEZO FANS
BELT-AIR FANS
"NV" BREEZO FANS

THE MILLER COMPANY

FOR TRUE VALUE IN LIGHTING EQUIPMENT LOOK TO THE MANUFACTURER. You can compare design and test data. But for Continuous Dependability you must rely on the maker. Behind Miller are 110 years' experience —million-dollar production facilities—1000 combined man years of field lighting engineering. Fluorescent, Incandescent, Mercury fixtures for industry, commerce, schools.

Meriden, Conn. Leaders in lighting since 1844

Field Sales Engineers:
C. Maddox, 2700 Connecticut Ave., N. W., Washington, D. C.; J. W. Fowler, 2709 Live Oak Drive, Nashville, Tenn.; Ben Clarkson, 6147 Prestonshire Lane, Dallas, Texas; Furna E. Lott, 5818 S. W. 28th Street, Miami 44, Florida.

applications of L-M fibre conduit in the electrical industry. He makes his headquarters in L-M's Atlanta office and is available for consultation in the states of North Carolina, South Carolina, Tennessee, Arkansas, Louisiana, Mississippi, Alabama, Georgia, and Florida.

The Arrow-Hart & Hegeman Electric Co., Hartford, Conn., has announced the appointment of **Leslie Goodwin** as supervisor of the company's district office located at 172 Simpson St., Atlanta, Ga.

Mr. Goodwin has been transferred from Houston, Texas, and will be in

Leslie Goodwin

charge of the company's sales for wiring devices, motor controls and electrical appliance controls. He is a native of Texas, attended Southern Methodist University in Dallas, and served four years in World War II with the U. S. Army Transportation Corps. Mr. Goodwin joined Arrow-Hart & Hegeman in 1949 as a salesman in Southern Texas and Louisiana.

Globe Lighting Products, Inc., Brooklyn, N. Y., has announced the appointment of **Ed Skillman** as sales promotion, advertising and merchandising manager. Mr. Skilman's former experience in this field has been as a national committee executive

Ed Skillman

secretary for the National Assn. of Manufacturers; eastern promotional executive for the National Metal Trades Assn.; sales and advertising manager of Aeroil Products Co.; public relations manager of the Advertising Club of New York; and as managing-director of the Advertising Club of Baltimore.

Recently, Mr. Skillman completed talks on home-furnishings in a five state air travel itinerary before the homeowners of leading Southeastern cities, appearing at Rich's in Atlanta; Burdine's in Miami; Ivey's in Daytona Beach; Mass Brothers in Tampa and St. Petersburg; Bon Marche in Pensacola; Davison-Paxon in Augusta; Levy's in Savannah; Efird's in Charleston; Adam Glass in Mobile; and Blackburns and Pizitz in Birmingham.

Three men have been named to key managerial posts in the **General Electric Company's** public relations and advertising operations, it was announced recently.

Kenneth G. Patrick, of New York, has been appointed manager of edu-

K. G. Patrick

cational relations services in the company's public relations services division. He will be succeeded in his former position as manager of general public relations services by **J. Stanford Smith**, of Schenectady, N. Y.

Concurrently, **Ralston B. Reid** has

J. S. Smith

Triplex Self-Supporting Secondary and Service Drop Cable—Regularly supplied with stranded or solid all-aluminum power conductors, insulated with RoPrene (Neoprene) and incorporating ACSR or other suitable bare neutral messenger. All-aluminum, copper or copperweld messengers also available. RoLene (polyethylene) insulation available in place of RoPrene.

Rome Triplex Service Drop Cable provides neat, clean looking installation in new home area.

Triplex is ideal for replacements on older houses too, particularly where eaves and roofs pose space problem.

Rome Triplex is less subject to damage by storm and falling tree limbs.

Installation at pole and house is easy and quick, cutting costly man-hours and permitting less expensive hardware.

Pole costs cut up to 50% with Rome Aluminum Triplex

Applications of Rome Aluminum Triplex secondary and service drop cable show several outstanding cost advantages over conventional bare or weatherproof open wire construction.

For one thing, by proper mechanical design it may eliminate one-third to one-half the number of poles normally required for conventional open wire secondaries. This adds up to a substantial saving. It is also possible to utilize mid-span connections for service drops.

Rome Aluminum Triplex is particularly desirable for new residential developments. It is neat in appearance while mechanical design and light weight minimize sag tendencies. This cable construction, with its strong messenger, also affords greater protection against wind and ice loading damage.

Fewer accessories are needed for secondary and service drop connections than for open wire. Maintenance is less costly; conductors are easily accessible.

Longer service life is assured because of mechanical design. RoPrene (Neoprene) and RoLene (polyethylene) insulation have exceptional resistance to weather and all climatic conditions. There are no braids to rot or festoon. Replacement is minimized.

So whether it's secondary or service drop cable or weatherproof wire for distribution, Rome Aluminum offers you a host of advantages. Bulletin RS-5 tells the story—write for it today.

Rome Weatherproof Wire

Regularly supplied with solid or stranded all-aluminum or ACSR conductors, covered with RoLene or RoPrene. Conventional URC triple braid covering can also be supplied.

Rome ALUMINUM

ROME CABLE CORPORATION, ROME, N.Y., AND TORRANCE, CALIF.

FOR SOLVING YOUR DRILLING
& ANCHORING PROBLEMS
NOW AND FOR THE FUTURE

Always Specify ARRO

TRADE ARRO MARK

See your industrial, hardware or electrical supplier

ARRO EXPANSION BOLT COMPANY
1520 Boone Ave., Marion, Ohio

R. B. Reid

been named to replace Mr. Smith as manager of advertising and sales promotion for the G-E Apparatus Sales Division at Schenectady.

Mr. Reid has been manager of program planning and research for the Apparatus Advertising and Sales Promotion Department since early last year. Prior to that he served as assistant manager of the department.

Francis J. Gannon, president of **Tampa Electric Co.**, Tampa, Fla., died January 9, 1954. He was 67.

Mr. Gannon's career in the electrical industry began in 1902, at the age of 16, when he was a messenger in the office of Stone and Webster in Boston. After two years with

Francis J. Gannon

Stone and Webster, he went to Dallas, Texas, with the Dallas Power & Light Company. Successive transfers thereafter took him to the Pawtucket Electric Co., Pawtucket, R. I., the Edison Illuminating Co., Brockton, Mass., the Sierra Pacific Power Co., of Reno, Nevada, and to the North Texas Traction Co., Fort Worth, Texas.

He had his first job in Tampa in 1926, when he was made vice-president and treasurer of Davis Islands, Inc. In 1928, he was made president of the El Paso Electric Co., El Paso, Texas. In 1931, he returned to Tampa as vice-president and general manager of Tampa Electric Co., and became its president in 1946.

Newest in the ROYAL family of molded cord sets...

. . . with ALL the features a quality range cord should have . . .

- Molded-on rubber range plug • adjustable zinc-plated steel strain-relief
- ROYAL quality rubber-covered range cable
- Conductors crimped and soldered to contact blades which are permanently sealed in molded rubber body
- Stranded, flexible copper conductors extended to tips of terminals—can't pull out
- Complete, ready to install, for maximum service and long life
- Every component part fully listed by Underwriters' Laboratories, Inc.

It's an accepted fact in the electrical trade that "you just can't beat a Royal molded cord." And, here is further proof, to fill the growing demand for a range cord set with the quality characteristics that Royal builds into its full molded cord set line. So,

buy ROYAL... you'll *sell* better!

Catalog Number	Conductors	Length	Rating	Standard Pkg. Quant.	Standard Pkg. Weight
M-4000	2 #6 – 1 #8	36"	50A – 250V	12	23 lbs.
M-4001	2 #8 – 1 #10	36"	35A – 250V	12	19
M-4002	3 #6	36"	50A – 250V	12	25
M-4005	2 #6 – 1 #8	60"	50A – 250V	6	18

ROYAL ELECTRIC COMPANY INC. ROYAL PAWTUCKET • RHODE ISLAND

WIRE • CORD SETS • FUSES • DEVICES • DECORATIVE CHRISTMAS LIGHTING

Represented by FULWILER & CHAPMAN, ATLANTA - GREENSBORO - NEW ORLEANS

MAGNI FLOOD

Island Area Light with porcelain Vitreous enamel reflector. Cat. No. IS

Back Prong Lamp Holder for sealed beam Par 56 300 w. lamp. Cat. No. L

Regular Medium Base Lamp Holder for sealed beam Par 38 R-30 and R-40 lamps. Cat. No. R

Mogul Base Lamp Holder for sealed beam R-40, 300 and 500 w. lamps. Cat. No. M

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MAGNI FLOOD Inc.

38 North Second Ave., Mt. Vernon, N. Y.

Warehouse stock maintained in: Miami, Fla., New Orleans, Dallas, Texas; Phila., Pa.

New products

Reflector lamps

AN EXPANDED LINE of reflector lamps is now available from the Westinghouse Electric Corp., Lamp Div., MacArthur Ave., Bloomfield, N. J.

The new line includes six reflector lamps of various ratings and beam spreads, from 550 to 800 watts, 115 to 250 volts and 8500 to 11,400 approximate initial lumens.

Because the lamps will normally

be used under conditions where maintenance labor costs are high, they have been designed for a life of 2000 hours. They maintain light output to a high degree throughout their life regardless of surrounding atmospheric conditions.

Although designed for base-up burning only the lamps still can be tilted approximately 25 degrees without greatly affecting performance. It is necessary to protect them from water to prevent breakage.

Dry-type transformers

HINDLE Transformer Co. of Flemington, N. J., is offering to the electrical industry a complete new group of Dry Type transformers. Class B

and C insulation materials are used throughout.

Hindle Dry Type transformers are recommended for use to: stepdown power line voltage for operating electrical equipment such as: Machine tools, Pumps, Compressors, Rectifiers, Welders, Infra-red and resistance ovens, Electric furnaces, Saws, Motors, Portable power tools, Fans, Soldering irons and pots, and Appliances; to insulate or isolate lighting and other circuits from power circuits; for boosting low line voltage or lowering high line voltage; distributing power from 600, 480 or 240 volt lines; to furnish the proper voltage of low voltage lines; also phase changing.

The standard line of Hindle Dry Type transformers is made in all standard sizes up to 200 KVA. However, special units are obtainable in sizes up to 15,000 volts; 1-2-3 phase 25, 50, 60 and 400 cycles and from 25 VA to 200 KVA. For further information, contact Hindle Transformer Co., Inc., Flemington, N. J.

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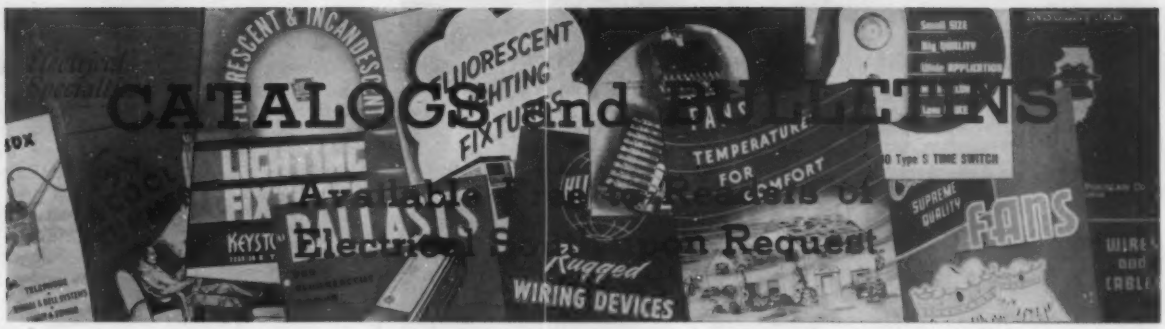

1011—Conduits. "Natural Electric Conduits" is the title of the 30-page Catalog No. 603 which describes and illustrates the many types of electrical conduits that are manufactured by National Electric Products Corp., 2 Gateway Center, Pittsburgh 22, Pa.

1015—Squeezon Connectors. The Squeezon, a new compression connector for power lines, is fully described in bulletin, "SQ" available from the James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo. The Squeezon features greatly increased electrical and mechanical efficiency at approximately half the cost of conventional connectors.

1019—Service Panels. Information on protective electrical control centers for homes, apartment buildings, service stations, and industrial applications is contained in Bulletin PM-355, "BullDog Pushmatic Electric-Centers," issued by BullDog Electric Products Co., 7610 Jos Campau, Detroit, Michigan.

1051—Transformers. "Care and Maintenance of Marcus Dry Type Transformers" manual No. M-100 goes into a complete description of the proper method of installing dry type transformers, particularly Class B, in all of the sizes which dry type transformers are available today. In addition, the proper maintenance methods for insuring long life and interruption free service are described. There is also a section included on the protection of dry type transformers against surges due to lightning, switching, etc. Marcus Transformer Co., Inc., 32-34 Montgomery St., Hillside, N. J.

1071—Plugs and Receptacles. Additional loose-leaf sheets for insertion in the Pylet Catalog 1100 are available from the Pyle-National Co., 1354 N. Kostner Ave., Chicago 51, Ill. These pages describe a wide range of plugs and receptacles for special purposes.

1079—Washer Lugs. Krueger and Hudepohl, 3 E. Third St., Cincinnati 2, Ohio, in their Bulletin 8-DF, give information and catalog listings for their complete line of K&H solderless terminal folding double cupped washer lugs. The folder explains uses and applications of all the lugs.

1081—Busduct Data. Various applications of the FA busduct for industrial purposes are illustrated in this bulletin made available by the Frank Adams Electric Co., P. O. Box 357, St. Louis, Mo.

1085—Lighting Fixtures. Eastern presents their most complete catalog, 32 pages of engineered lighting data, including a variety of fixtures for all architectural, commercial and industrial applications. Eastern Fixture Co., Inc., 170 Vernon St., Boston 20, Mass.

1087. Fittings. The M. & W. Electric Mfg. Co., Inc., East Palestine, Ohio, has available their new 28 page catalog 53, covering Service Entrance Mast Fittings, Service Entrance Cable Fittings, Ground Clamps, Rods, BX and Romex Connectors, Conduit Fittings, Wireholders, Insulator Supports and Cable Racks.

1097—Flexible Cords and Cordsets. A complete 48-page catalog is available from the Cornish Wire Company, 50 Church Street, New York 7, N. Y. containing all data on flexible and portable cords, lamp cords, heater cords, cordsets, radio and electronic wires.

1099—Lighting Fixtures. Fluorescent and incandescent luminaires for schools, offices, stores and churches are illustrated in a series of bulletins issued by Curtis Lighting, Inc., 6134 West 65th Street, Chicago 38, Ill. The entire series or any individual bulletins may be obtained upon request.

1103—Electrical Connectors. Burndy Industrial Catalog 52, featuring a complete line of general-purpose connectors for industrial wiring is available. Complete information concerning application, construction features and dimensions of these connectors are included, as well as several pages devoted to engineering data. Published by Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54, N. Y.

1111—Control Centers. Colorful 24-page booklet by The Clark Controller Company, 1146 East 152nd Street, Cleveland 10, Ohio, describes advantages of Centralized electrical control systems through use of A.C. Motor Control Centers. Typical installations, specifications and planning pits are featured.

1113—Fans and Cooling Equipment. Signal Electric Manufacturing Co., Menominee, Mich., has recently issued its 1954 catalog which features the company's complete line of window, pedestal, desk, and oscillator fans. The new color book gives descriptions, features and specifications for each of the company's products.

ELECTRICAL SOUTH
806 Peachtree St., NE
Atlanta 5, Ga.

February, 1954

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Please send me the bulletins and catalogs indicated.

(Print Plainly)

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Circle numbers below. Bulletins and catalogs will be mailed promptly.

1011	1015	1019	1051	1071
1079	1081	1085	1087	1097
1099	1103	1111	1113	

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Chicago 10, Ill.

Utility wrench

A NEW UTILITY wrench, designed for easier and faster assembly of thin-wall fittings, and combining de-burring and non-slip tightening in one tool, is now being produced by Appleton Electric Co., 1701 Wellington Avenue, Chicago.

The wrench is for use with Apple-

ton compression-type couplings and connectors and economy two-piece connectors. It is available in two sizes, each with double ends, to handle ½" and ¾", or 1" and 1¼" fittings. Made of hardened drop forged steel, it is smoothly finished for comfortable gripping and scientifically balanced for proper leverage. The renewable de-burring and non-slip plate is case hardened.

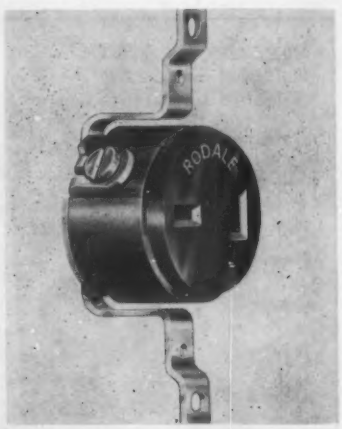
As a de-burring tool, the combination wrench smoothes newly-cut ends on thin-wall conduit — inside and out—simultaneously. When used as a whench, the non-slip shoulder plate and overlap lip hold the wrench snugly—both horizontally and vertically—on the individual nut to be tightened. This eliminates slippage in close quarters and on overhead work.

Between tightening turns, the wrench is lifted slightly off nut and turns freely on the rounded edge of the non-slip shoulder plate.

Industrial receptacle

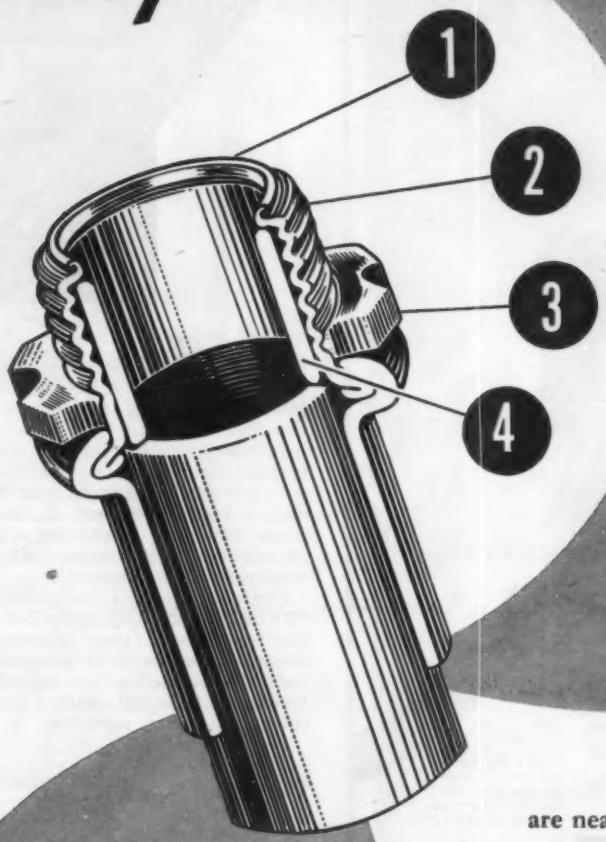
THE ADDITION of a newly-designed 10 ampere, two-wire "T" Polarity Flush Receptacle to the industrial line of Rodale Manufacturing Co., Emmaus, Pa., has been announced.

Completely new, it is listed as Rodale Catalog No. 1040. It features self-finding slots, double-wiping contacts, and extra large binding head screws for quick, simple ease of wir-



New B-M 21 E *Connector*

HAS *4* OUTSTANDING FEATURES



1 Smooth Rolled Edge Throat will not cut or scrape plastic insulation.

2 Full thread screws into all conduit fittings.

3 Nut screws down flush to shoulder for positive ground.

4 Internal sleeve same inside diameter as tubing insures smooth raceway for easy fishing.

All B-M Indenter Fittings are U. L. approved as Concretetight and for General Use. (File Card E 10863)

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

BRIEGEL METHOD TOOL CO.
GALVA, • ILLINOIS

Twist-Lock
TRADE-MARK

ELECTRICAL CONNECTORS

No. 7688
No. 7542

FIRST AND STILL THE FINEST

PLUG IN-- TWIST --LOCKED

Rugged

AND IT'S

For Greater CONVENIENCE, SAFETY and EFFICIENCY in the Operation of Motor-driven Tools or Portable Electrical Apparatus.

NEVER DISCONNECTS ACCIDENTALLY

The Hubbell Twist-Lock locking action insures a positive contact that will not come loose accidentally regardless of rough treatment, heavy vibration, or other conditions that might cause down-time and production loss. Twist-Lock is made in two-wire, three-wire and four-wire sizes. The three and four-wire sizes are available grounded and not grounded. For complete information, write Harvey Hubbell Inc., Dept. R-2, Bridgeport, Conn.

Here's the answer to many of your wiring problems. Write for this Twist-Lock booklet today!

THESE FEATURES MAKE ALL THE DIFFERENCE

- Properly polarized for protection against fire and shock.
- Three and four-wire types available grounded to metal cover on request.
- All exposed metal parts plated to resist corrosion.
- Precision-engineered for positive locking action.
- Sturdy cord grips eliminate wire "pull out."

Highest Grade HEAVY DUTY

WIRING HUBBELL DEVICES

HARVEY HUBBELL, INC.
BRIDGEPORT, CONN.

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ing. It also features complete interchangeability with all other types on the market. It is rated 10 ampere, 250 volts, 15 ampere, 125 volts, and is designed to accommodate standard single outlet plates.

Lighting ceilings

A NEW APPROACH to glare-free lighting is provided by the diffusing GrateLite ceilings recently developed by the Edwin F. Guth Co., 2615 Washington Ave., St. Louis, Mo.

The new plastic louver-diffuser is designed to form a completely illuminated ceiling for offices and stores.

In operation, the light is diffused through GrateLite's ⅝-inch translucent cubical facets which provide 45-degree lamp shielding. It fills the room with low brightness diffused illumination, distributes soft light evenly from wall to wall.

GrateLite sections rest on inverted "T" rails which are suspended from the overhead. Open construction keeps maintenance at a minimum, and when cleaning is required, the panels are removed, washed and destatisicized in two minutes.

Terminal connectors

ANDERSON BRASS Works, Inc., Birmingham, Ala., has recently added several sizes of a new series of bronze terminal connectors to their line. "Dura Lug" is the name which has been given to this new series of cast lugs.

The new Anderson Dura Lug is a high-conductivity bronze lug with a separate eye socket casting of high tensile bronze alloy. In performance and design this series incorporates many features long wanted by users of such lugs. The company states that this new lug is the only one of its type which passes the Mercurous Nitrate test.

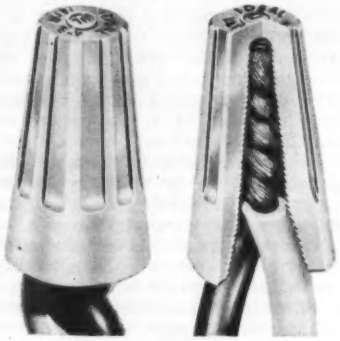
They are available in 11 different cable ranges, from number 14 through 2000MCM, and Underwriters' approval has been received on all

sizes through .050. One very popular and practical use feature is that the Dura Lugs require no special tools for installation.

Plastic wire connector

A NEW SCREW-ON wire connector with one-piece molded plastic threads and body has been developed by Ideal Industries, Inc., 1017 Park Ave., Sycamore, Illinois. The new connector is designed for low-cost connections of number 14, 16, and 18 wires, and is available in two sizes, A-1 and A-3.

The specially developed plastic used in these connectors has both



high impact strength for mechanical security and excellent dielectric properties. It does not absorb moisture and is impervious to most chemicals. Smooth, uniform threads grip wires securely without cutting of wire strands. The connectors will withstand temperatures up to 400 degrees F.

Ideal all-plastic connectors are a distinctive green color. They are approved by Underwriters' Laboratories for wire combinations from 2—No. 18 to 1—No. 14 and 2—No. 18.

Window fan

FASCO INDUSTRIES, Inc., Rochester, N. Y., have announced the availability of their new Model 2030 multi-purpose window fan. This new fan, with 20-inch hand balanced blades, is powered by a 1/15 horsepower shaded pole rubber mounted Fasco motor that develops 980 RPM at highest of three speeds and moves 3000 CFM.

Manually reversible, the Model 2030 snaps in and out of window panel in seconds. And, the fan is completely portable. It weighs only 20 pounds and has a comfortable grip-shaped carrying handle, non-tip base and long 8½ foot molded rubber cord.

A special feature is the absolute finger-safe guards on all sides. Sturdy legs at the base turn this fan into a portable air circulator.

Cope CABLE TROUGH

Cope Cable Trough being installed at the Etiwanda Steam Station—Southern California Edison Company.

EASY TO INSTALL
EASY TO MAINTAIN

Cope Cable Trough through its simplicity of design and its ease of installation is fast becoming one of the most popular methods of supporting power and control cables in generating stations & industrial plants.

Cope Cable Trough is furnished in completely fabricated sections, with a wide range of standard fittings (tees, elbows and dropouts) which can be easily laid out on drawings and quickly and economically assembled at the job site conforming to almost any requirement.

Write today for further information—Ask for Bulletin 2S.

You know Cope by these products

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Amarillo, Tex.—*Western Light and Supply Company, 75 N. Hughes St.*
Atlanta, Ga.—*The Gearhart Co., P.O. Box 85, North Side Station*
Charlotte 1, N. C.—*Glen & Larson, 123 Brevard Court*
Dallas, Tex.—*I. E. Cope & Co., 1411 Fidelity Union Life Bldg.*
Houston 2, Tex.—*I. E. Cope & Co., 2009 Fannin St.*
Jackson, Miss.—*Gregory-Salisbury & Co., 514 Court St.*
Jacksonville, Fla.—*The Gearhart Co., P.O. Box 5761*
Little Rock, Ark.—*Gregory-Salisbury & Co., 400 Shall St.*
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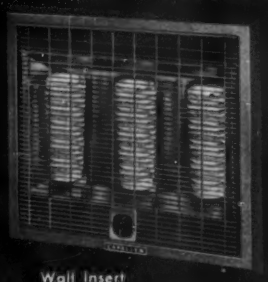
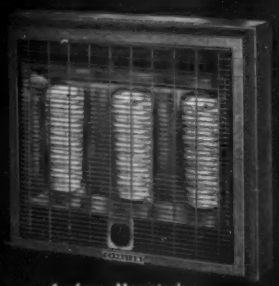
IS THE *ONLY* LINE OF AUTOMATIC ELECTRIC HEATERS WITH

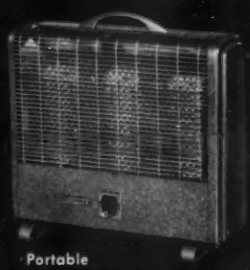
- 3-MINUTE CLEANING without removing a single screw. Assures clean heat from clean heaters.
- ⅓ MORE HEATED AIR delivered up through exclusive tapered cone construction.
- 2 INCHES LESS HEIGHT to fit under windows and in tight spots.
- THERMOSTAT PROTECTED for accuracy by Cavalier's exclusive double baffle.
- SIMPLE, ATTRACTIVE DESIGN finished in warm sun tan baked enamel. Blends with any color scheme or decoration.



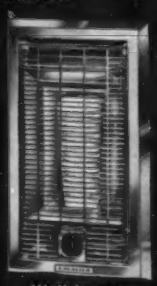
Wall Insert
1, 1½, 2, 3 and 4 KW



Surface Mounted
1, 1½, 2, 3 and 4 KW



Portable
2, 3 and 4 KW



Wall Insert
Full Chrome Finish
1.5 KW

COMPLETE LINE
from one dependable source

Write for Catalog and Guide for Calculations of Electric Space Heating

Floor Furnace
5 KW and 8 KW

QUALITY PRODUCTS SINCE 1865

CAVALIER CORPORATION

ELECTRIC HEATER DIVISION
CHATTANOOGA 2, TENNESSEE

ALSO AVAILABLE: Non-automatic Bathroom Heater

Window panels are easily and quickly installed with four screws, and extra panels are available to increase single fan's use throughout the home. Panels adjust from 29 to 37¼ inches to fit any standard double-hung window.

The new Fasco Model 2030 window fan is styled in blue-grey and chrome against a grey-ivory panel, and carries a full five-year guarantee.

Fuse construction feature

MONARCH FUSE CO., Jamestown, N. Y., has developed an outstanding process for securing the ferrule fitting to the fibre barrel on 30 and 60 ampere ferrule renewable fuses. The former pin or rivet type juncture which is in common use today, is a known weak point in a fuse's construction. Under constant use, the rivet becomes a hot spot which starts fibre charring and weakens the fibre barrel. This has meant decreased fuse life.

The new Monarch process completely does away with the former method. It is basically a flowing together of the tempered brass alloy ferrule and the fibre over the entire circumference of each. In assembly, the threaded ferrule fitting, which is a screw machine part, is slightly bell mouthed to slip over the turned end of the fibre tube. After it is threaded on, a die is passed over the barrel and the brass flows into the fibre at great pressure to form a solid junction. Tests conducted by Monarch have proven it to have a fool-proof strength and give a marked increase in fuse life.

This design is only applicable to Monarch renewable ferrule fuses. There is no price increase for this major improvement.

Manual starting switch

THE ARROW-HART & HEGEMAN ELECTRIC CO., Hartford, Conn., has announced the availability of a new type "LM" loom switch—a size 0, across-the-line, manual starting switch for single or multiple shuttle textile looms.

The type "LM" is described as an entirely new and radically different

type of loom switch developed and built specifically for the textile industry. It is housed in a lint proof enclosure of heavy gauge, formed steel with a free-swinging hinged door and a balloon type, neoprene impression gasket.

An outstanding feature is the unique, statically balanced, rotary type mechanism capable of resisting shock and vibration far in excess of any encountered in actual loom installations.

The unusually compact mechanism —entirely enclosed for extra safety and additional protection against lint—is described as "two-units-in-one." The mechanism consists, internally, of two complete and separate units, the main contacts and the overload tripping device. All abnormal overloads are interrupted by the overload tripping device, and not the main contacts.

Distribution line switch

SOUTHERN STATES Equipment Corp., Hampton, Ga., recently announced a new distribution line switch, the Type PH, available in 7.5 kv and 15 kv in continuous current ratings of 200 and 400 amperes.

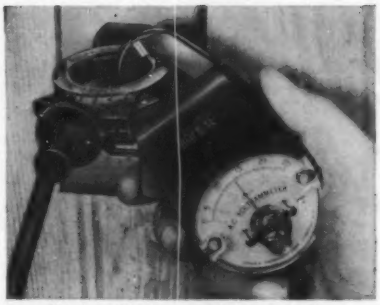
The Type PH is a single pole, single throw, hook operated switch specifically designed for wood cross arm mounting in vertical or underhung positions.

Some of the outstanding features of the PH are high pressure line contacts, positive latching, parallel blade construction, integral terminals and blade pry-out action.

Aluminum wall plates

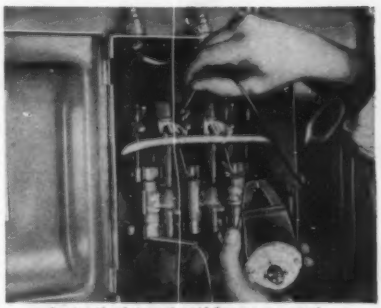
WALL PLATES, which are made of long-lasting aluminum and will not warp, crack or rust, are being offered to the electrical trade by Lexsuco, Inc., 4815 Lexington Ave., Cleveland 3, Ohio.

Called Sianor Plates, these plates are over-size to eliminate all need for shields or mats for wall protection against soil and unsightly finger print marks. They are available for one, two and three gang toggle, push

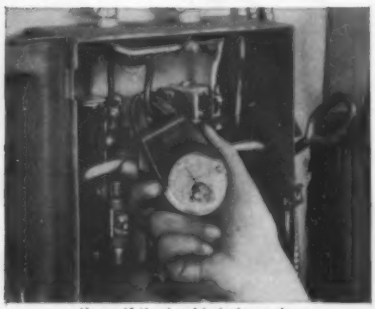


Check appliance current at receptacle

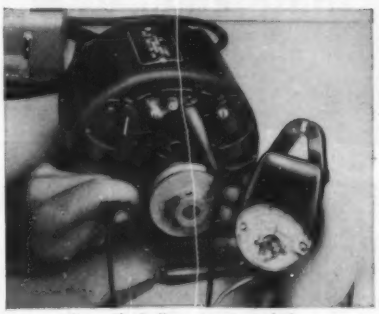
Trouble-shoot relays quickly



Instantly determine if fuses are good



Know if the load is balanced



Know if windings are grounded

Expand low-amp reading by doubling lead

Eliminate Guesswork!

NOW EVERY MAN CAN BE EQUIPPED WITH THIS POCKET VOLT-AMP TESTER

Here is a real improvement for the men on your crew who now use a voltage tester. It's the Amprobe Jr., a pocket tester that measures both voltage and current, with instrument accuracy, without shutting down equipment. And the cost is only $19.85 (just a few dollars more than an ordinary voltage tester), so every electrician and plant maintenance man can carry one.

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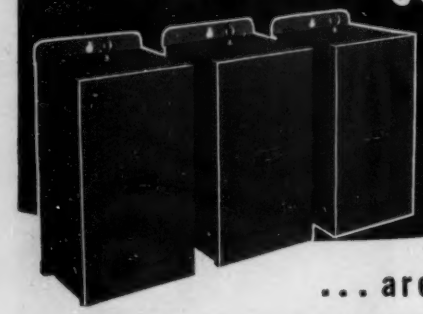

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One device horizontal, one device vertical, two device horizontal and three device horizontal interchangeable Sianor plates can be had for one, two and three gang switches.

New developments

(*Continued from page* 50)

The new line-voltage thermostat has been developed from an earlier model which has been widely used in commercial and industrial installations. Built to handle electrical resistance (heater) loads up to 4,000 watts, it combines an operating differential of only one degree with a functional design that makes possible a thermostat of relatively light weight and low mass. This, Honeywell engineers point out, is important in reducing the time lag in switching action.

The instrument is mounted horizontally with large-size vents to provide maximum reaction to changes in room temperature.

Temperature sensing is accomplished by a small vapor-filled metal bellows which is not appreciably affected whether the instrument is used at high altitude or sea level.

Switching action in the new line-voltage thermostat is accomplished by a rugged, 17.5-ampere Honeywell Micro switch which has a 4,000-watt resistance load rating at 230 volts.

The use of enclosed mercury switches in the new instruments has become increasingly important from a service and maintenance standpoint, Honeywell engineers explain. The contacts are completely sealed so no dust, lint or foreign matter can collect on contact points—an important problem in electrical connections in modern houses with their large areas of glass, wall-to-wall carpeting, vacuum cleaners, draperies and automatic clothes dryers.

While the line-voltage thermostat is an adaptation of a successfully-used commercial instrument, the new Honeywell "round" used in low-voltage systems is a radical departure from the familiar rectangular instrument used for home temperature control for more than 70 years. Styled by Henry Dreyfuss, noted industrial designer, the "round's" unique decorator feature has already attracted wide attention among interior decorators.

Industry Day Forum

(*Continued from page 25*)

ever, indicated that many wholesalers were selling more ivory items than brown items.

One member inquired as to whether the supply of mercury switches would improve. Only a few manufacturers are making such switches. Supply is improved and it is not thought that they are to be discontinued.

Mr. Buchan showed an improved label for a wiring device carton, and pointed out that this improved label came as a result of last year's panel discussion.

Conduit, boxes, and fittings

Panel Number 3, with the assignment of discussing problems relating to conduit products, boxes and fittings, was presided over by Lew W. Hill, of Hill-Soberg Co., Mobile, Ala. With him on the panel were A. A. Snowball, vice-president in charge of sales, Pittsburg Standard Conduit Co., Pittsburg; R. G. Eck, sales manager, All-Steel Equipment, Inc., Aurora, Ill.; and J. C. Grindell, sales manager, Killark Manufacturing Co., St. Louis.

Mr. Snowball pointed out that margins on conduit and EMT products are very small and that labor costs have increased more rapidly than over-all prices. He pointed out that he expected a good year in 1954. He reviewed the problems that entered into freight absorption as a competitive sales aid.

A question from the floor asked if there were any efforts to standardize conduit finish. Mr. Snowball explained that some four or five or more finishes were in use and each company generally tries to capitalize on the method it uses. He felt that there was little effort to standardize.

Mr. Eck discussed the question as to whether box lines should be simplified. He said he favored simplification, but that contractors throughout the U. S. each favor certain items that seem to best meet local needs. Many contractors are now using larger boxes, but some are still skimping and using small boxes. He felt that three-and-a-quarter inch boxes should be eliminated.

Each year, Mr. Eck said, they revised their products and slow movers are discontinued. As an example, 54 items will be dropped this year.

Standard packaging quantities favored most now are 50, Mr. Eck reported. Some box covers are packed 25 to the carton. More popular covers are packed in cartons of 100.

The universal number system was again brought up. The box industry always has been opposed to the identification of their boxes by universal numbers.

The explosion-proof line of fittings has become an important part of the fitting manufacturers line, and a fine part of their business, it was reported.

Is there any trend to make conduit fittings with more room inside? This question was answered by Mr. Grindell who said that all makers tried to smooth up patterns to give as much inside space as possible. With new wires the net result is more space than ever before. Also most manufacturers make both standard and mogul sizes.

The problem of conduit for corrosive soils was discussed at length but no one had an answer applicable in all cases. Plastic pipe has not proved too feasible because of pull-

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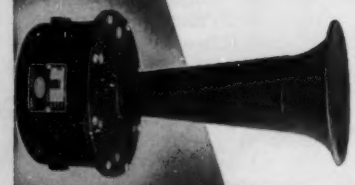

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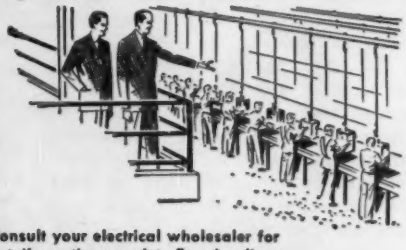

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ing problems, one member reported.

T. W. Wells, Jr., Wells Electric Supply Co., Inc., Birmingham, Ala., presided over Panel Number 3 on industrial, commercial and residential lighting. Assisting him were C. A. Burton, general sales manager, Sylvania Electric Products, Inc., Salem, Mass.; Fred Guth, vice-president, the Edwin F. Guth Co., St. Louis, Mo.; and Norman H. Vacha, vice-president, John C. Virden Co., Cleveland, Ohio.

Lighting products

In predicting electrical business for 1954, C. A. Burton compared expectations to an 80 golfer who has shot a 78 but now must return to his old game. He said that unit sales increase may be up five to eight per cent this year and dollar sales up eight to 10 per cent. He also predicted that the industrial phase of the electrical business may drop some seven or eight per cent; that residential sales would be up as much as 10 per cent; and the educational phase of the business would remain approximately even, with institutional business probably getting a 10 per cent gain.

Mr. Burton said that electrical wholesalers and dealers are in an "artificial pricing market"; that they are giving allegiance to manufacturers who do not in turn give the wholesalers and dealers the support they deserve.

In speaking on what could be done in regard to stocks of obsolete merchandise, Mr. Vacha said that the quickest way to dispose of such was to take a mark down. He said that a lot of times one wholesaler or dealer would be overstocked on an obsolete catalog item that another dealer would like very much to have. He suggested that when a wholesaler finds he is well stocked on an item now classed as obsolete, that the best thing to do was to have each of his salesmen take a sample of this item around with him so that the merchandise could be moved and the storage space utilized for new items.

He advised the SEWA members to watch inventory control closely and to co-operate with manufacturers. He said that manufacturers' salesmen can be very helpful when they know what a wholesalers situation is and that they should be ever mindful of the needs of the individual wholesaler.

Mr. Guth cited the need of a lighting specialist in the wholesaler organization. He said he realized that the employment and

training of such a specialist would involve a large original investment, but that it would pay off well in the long run by enabling the wholesaler and contractor to realize a better mark up.

Mr. Burton said that the lamp manufacturers have spearheaded the promotion for better lighting in home and industry and that the utilities are now picking up the ball. He said that both the manufacturers and utilities are endeavoring to gain recognition for electrical contractors, and that lamp manufacturers and wholesalers are working together to build higher lighting standards in local areas. He said there must be allegiance between the wholesalers and manufacturers, that money invested in better lighting programs will go to waste if standards are not maintained.

Mr. Vacha cited the need for well lighted fixture display rooms. He said that better lighting and more lighting can be sold with such displays, that customers have to be shown what this lighting will do for them. He told the audience that local communities must be told where lighting can be seen and demonstrated, and advised more and bigger local advertising programs.

"The important thing is to show people what lighting will do for *them*," he said. He said building allowances for home wiring and lighting will be increased when people see what they're getting for their money.

Mr. Burton told the SEWA members of a bill currently pending in the Congress that would end job shopping for sub-contracts on government jobs. He said that passage of the bill would mean frozen specifications and would do away with substitution of inferior products in such projects and also do away with price cutting and pressure from all sides on contractor, wholesaler and manufacturer. He said that NECA and the Association of Government Purchasers are supporting the bill and urged all SEWA members to lend their support, saying that passage would result in higher profits for them and contractors.

D. B. Clayton, president of NECA, enlarged on this subject and defined the bill in question as SA-48, or the Better Construction Contract Bill. He said there was a lot of opposition from general contractors and heads of government bureaus, who regarded their bureau as "the government" in their

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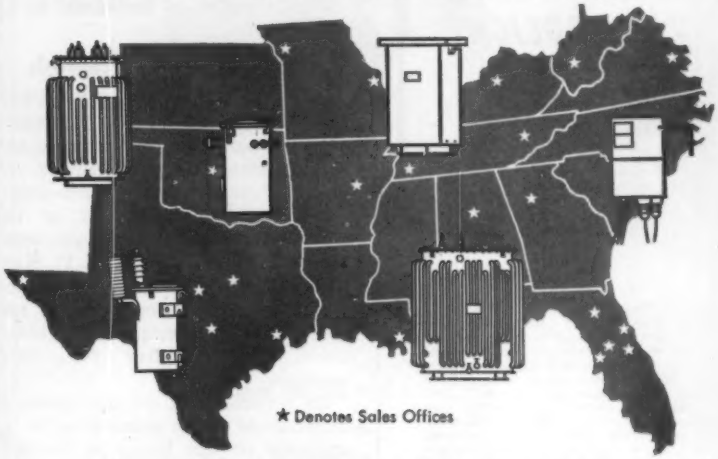

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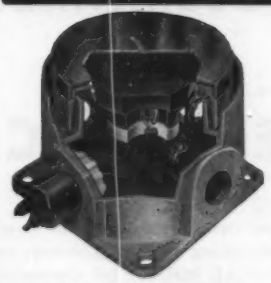

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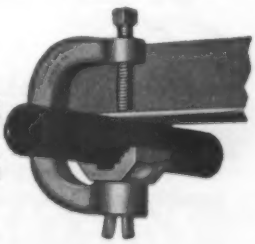

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area of jurisdiction and wanted no meddling or controls of any sort. Mr. Clayton said that the bill's passage would be beneficial to all concerned.

Panel boards and controls

J. B. Carson, Kingsport Electric Co., Kingsport, Tenn., presided over the panel boards, switches and motor controls panel, which included Perry M. Green, vice-president and sales manager of the Continental Electric Equipment Co., Cincinnati, Ohio; M. P. Kartalia, manager, merchandise sales, Square D Co., Detroit, Mich.; and L. C. Watson, manager, distributor sales, Allen-Bradley Co., Milwaukee, Wis.

In commenting on the question of whether there seemed to be an increase of the trend to by-pass the wholesaler in the manufacturer - wholesaler - contractor chain, Mr. Kartalia said that he didn't think such a trend was on the increase in this phase of the electrical business—not near to such an extent as it is in the appliance business. However, he said that there would always be some that would take to this type of operation. He said the best way to combat such practices was for the manufacturers and distributors to utilize closer teamwork in their over-all operations.

He said that wholesalers must keep adequate stocks so that they would be able to meet product demands at all times, and said that it was the manufacturer's responsibility to see that supplementary stocks of primarily slow moving stock be located at strategic warehouses so that the wholesaler could be supplied promptly in any eventuality. He said that many wholesalers are hurting themselves by overstocking their warehouses with fast moving merchandise. He cited the distributor need for well trained sales personnel whose primary responsibility is to push the manufacturer's products. In turn, he said, the manufacturer should back the distributor and distributor salesmen with a strong national advertising program.

Mr. Carson commented that the best way for a distributor to move his stock was to be sure that his salesmen had a thorough knowledge of the amount of goods in stock when promising deliveries, that they have intelligent information about the product, and that

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they help in every way possible to expedite delivery of the product. They should also have a thorough knowledge of the extent of credit that can be allowed. The wholesalers, he said, should charge a price for their product commensurate with the service rendered.

Mr. Watson in commenting on the future of the electrical wholesaler in the control field said that "If you want to know where you're going in the control field, you must first look back and see where you've been." He said that in 1942 the wholesaler had a pretty "sad percentage" of the control business and that the situation has improved some, but not to any great extent. He said that in order to get more of this business, the wholesaler must give the customer better service than he is now getting from the manufacturer.

Mr. Kartalia said that the best way for a wholesaler to get into the motor control field was to "grab hold" of those products in this field that he can best handle at the present time and "go on from there."

Motor shop competition

In commenting on the question of the place of the motor repair shop in the motor control field, Mr. Watson said that this phase of the industry has accumulated quite a bit of business in the field because of their close association with what he termed the "dirty hands" in the plants—the personnel who actually work with the equipment.

Mr. Carson said that one of the great problems of the industry is the fact that the "lesser personnel" at the manufacturer's plants, the people who actually fill the orders, are not familiar with the value of schedules on a job. He said young men hired directly from college by the manufacturers should be given some time in the field to get a thorough understanding of such values.

On the question—"Have panel board manufacturers given consideration to standardization?"—Mr. Green said that considerable thought to this problem had been given by NEMA members and that for the most part panel boards manufactured by members were satndardized. He said the trouble lies in the fact that there are a good many panel board manufacturers who are not members of NEMA, and that these non-members were the ones actually causing the problem of non-standardization

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in the panel board field.

Mr. Kartalia said that the manufacturers were much nearer power panel board standardization on lighting boards.

Mr. Green said that switchgear and unit sub-station equipment is now being sold direct from manufacturer rather than through distributors because of the engineering problems involved.

The concluding session of the conference included three addresses. The key-note address was made by Lothair Teetor, assistant secretary of commerce for domestic affairs, Washington, D. C., whose subject was "What's Ahead for 1954."

Blaine F. Fairless, sales manager, Steel City Electric Co., Pittsburgh, spoke on "The Business Man in the Community." The closing address was made by Arthur W. Hooper, editor, *Electrical Wholesaling*, whose subject was "Three Little Words."

Heat pump progress

(*Continued from page* 30)

the Southern Research Institute, of Birmingham, Ala., which interviewed more than 100 home owners and others who had installed such equipment. S. L. Pappas and F. R. O'Brien, who did the footwork in these interviews, reported that 85 per cent answered "yes" to a question as to whether they would install heat pumps if they had to do it all over again. Faulty installation was the cause of the 15 per cent dissatisfaction. The survey was conducted for Southern Services, Inc., an organization of Southern utilities.

Among the Florida electrical concerns that have been in the heat pump business for some time and have contributed to the outstanding development in that state, particularly in the Tampa Bay area, is Advance Appliance Co., of Tampa. Another is the City Fuel Co., of St. Petersburg, which possibly saw heat pumps as "an ace in the hole" in case they supplant fuel oil heat to a large extent in the future.

The Advance Appliance Co., according to Sam F. Graziano, president, has developed heat pump business largely by word-of-mouth advertising. Its business has been largely developed up to this point by talking with architects, builders and home owners. When it ran an advertisement in Tampa newspapers, the response swamped mail and telephone lines, bringing about

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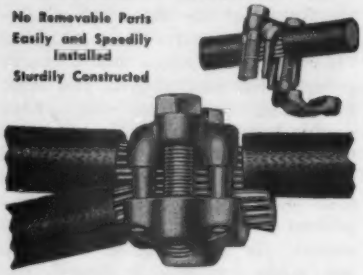

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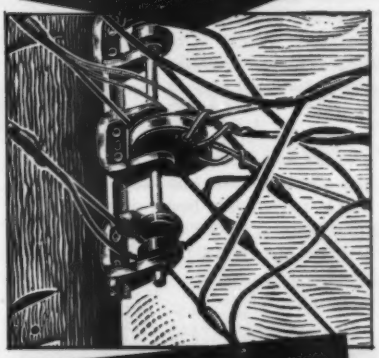

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a decision to proceed more slowly until the organization could take care of every inquiry satisfactorily.

Its earliest business was mostly in make-up units in 2 to 20 hp for commercial installations, which brought about the formation of an affiliated manufacturing company which now has brought out a package unit in 2 to 5 hp sizes with a production target of 25 a week and employment of 50 workers. This is as good an illustration as any of the growth of this market.

The first residential installation made by Advance Appliance was for Dr. and Mrs. L. C. Gonzales, of Tampa, a 5 hp job in a large home. The kind of report Advance Appliance later got from Mrs. Gonzales that she would rather part with her automobile than with the heat pump system gave the company one of its best selling arguments and resulted in many more home installations.

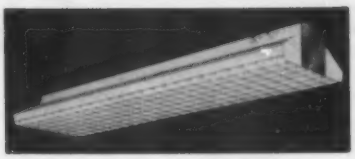
Motor courts, restaurants, stores and offices have also been among the company's customers.

Although the heat pump probably will have its biggest development in the United States, it is not of American origin. It is said to have been first used in Switzerland, where they are many hydroelectric plants but no coal or oil. American manufacturers were toying with the idea of developing them here as far back as the 1920s, but the first package unit was not introduced until 1947. By July, 1947, only 160 of all types had been installed in the entire country and progress in the ensuing years was slow.

In the first year following July, 1947, less than 100 more had been installed. By February, 1950, there were only 436 and nearly two years later, in December 1951, the total had climbed only to 606. Between that date and last March an additional 408 had been installed. This year's push probably has been the biggest.

Possibly no one in the South has followed the heat pump development more closely than Guy C. Hall of Florida Power Corp. Mr. Hall joined the company as an air conditioning engineer in 1945. A year ago the air conditioning department was organized. It employs six air conditioning and service engineers.

To those who may contemplate getting into the heat pump business, Mr. Hall's advice is that prospects can be readily developed in most communities by newspaper



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advertising and personal calls on architects, builders and home owners. He says that installation is more difficult and costly in older homes than in those yet to be built, but not more so than installation of conventional heating systems and air conditioning. Electric heat of the resistance type is four times as costly to operate as a heat pump.

The cost of residential installations varies. It is lowest in a new home designed around the heat pump as an integral part of the structure. A 2 hp unit in a new Jacksonville three-bedroom home was recently installed for $1341. The cost for installing in a house already built would have been about 50 per cent higher.

A rule-of-thumb estimate for existent houses is $750 per horsepower, with 2 hp recommended for a two-bedroom home and 3 hp for a three-bedroom house, somewhat less if the heat pump becomes a part of the original design of a new home. Commercial installations, mostly water-to-air jobs, average about $600 per hp in the range of 2 to 20 hp (horsepower and tons are used alternately, but the trade prefers the horsepower designation).

There have been some unusual installations in the South. At the famous Silver Springs, at Ocala, Fla., water for heating and cooling the restaurant, gift shop and executive offices was obtained from the springs where ordinarily a well would have been drilled.

At Cordele, Ga., the Crisp County Courthouse is a three-story building, with the top floor being used as a jail. When a heat pump installation was considered there was no desire to pamper the prisoners by giving them cooled air in the summer, but it was found that the entire building could be heated and cooled more economically by one system, an 85-hp job, than by using a different system for the jail portion of the building, so Crisp County prisoners are air conditioned summer and winter.

DP&L meter lab

(*Continued from page 27*)

14 of the trucks and two of the passenger cars being equipped with two-way radio. This permits communication between the division office dispatcher and the various crews at their work. This communication system makes it possible for the office to dispense an emergency assignment to the nearest crew.

Before the remodeling and modernizing program for the meter division, Mr. Armour and M. B. Donegan, supervisor of the meter laboratory, visited equipment factories and other utilities in search of ideas. As a result, physical facilities were arranged in sections for improvement of efficiency. The quarters are entirely air conditioned for the comfort of the employees and to eliminate dust that had previously been a hindering factor in the cleaning and testing of meters. The offices and work areas are ideally lighted for improved working conditions. On the remodeling and modernization, Mr. Armour comments:

"There is more efficiency now than we had before and our work is better coordinated.

"There are some utilities where there is more equipment and where, perhaps, they are thus enabled to do a better job than we, but, we believe we are doing a pretty good job in our meter division."

The division has 95 employees and, in addition to Mr. Armour and Mr. Donegan, other key men are A. O. Lightfoot, head of the clerical section; F. R. Cain, in charge of the meter testing section and K. W. Lilly, head of the service section.

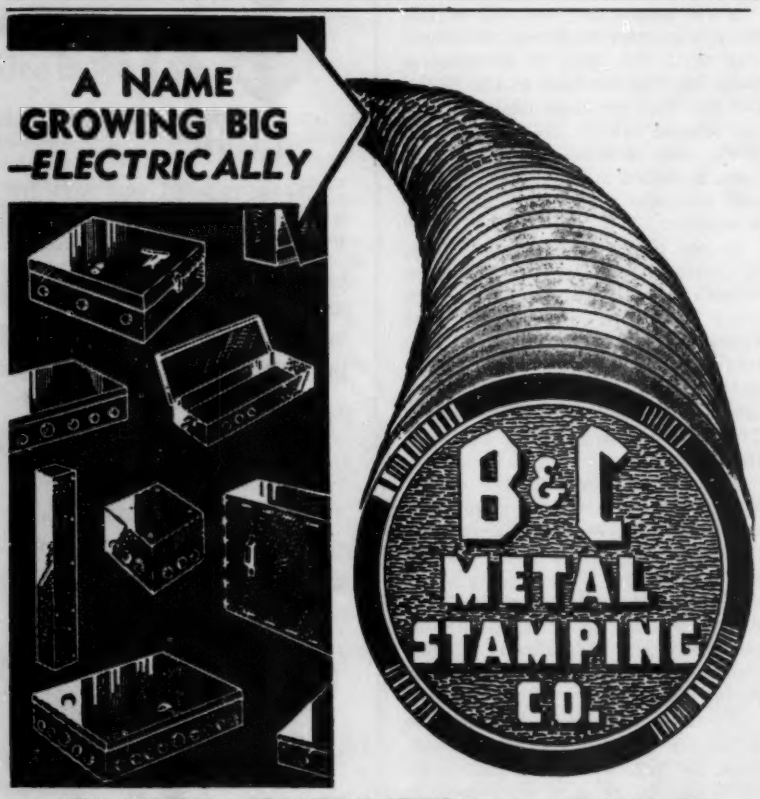
Protecting motors

(*Continued from page 21*)

for this relay, which has a retail price of approximately $80.

With three phase service being supplied, the two current coils are displaced in phase angle 120 degrees, and the disc rotates. This disc turns less than one revolution and strikes a stop where it is held as long as this phase balance and relation exists. The contacts of this relay are closed when in this position, and the motor contactor holding coil circuit is thus closed. If one of the lines in which the relay current coil is connected is opened, then the torque holding the disc against the stop is eliminated, and the disc through spring action reverses and opens the contacts in the magnetic holding coil circuit.

Should the line in which there is no current coil open (Line L_1), the phase displacement of the two remaining coils will be shifted so that the holding torque is also eliminated, and the relay contacts



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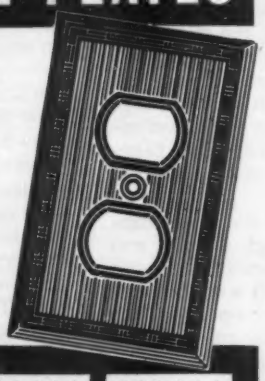

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are opened.

The cost of this relay has been the main hindrance to its use. Little or no trouble has occurred from a maintenance standpoint, and it is fairly simple to use.

A third method is available using voltage relays. This is shown schematically in Figure 3. With the use of telephone type relays, rectifiers, and condensers, the relay can be adjusted to open when the voltage on one phase drops below 200 volts. The regenerated voltage then will not keep the protective equipment from functioning. The cost of manufacturing however was found to be approximately $60 per relay, and this along with its fairly complicated circuit has made it impractical.

The most recent relay developed for this protection uses a three legged plate, each leg being placed over a series current coil in one of each three phases. With balanced current, the plate is pulled equally against all three coils. Then with one line opened and the coil in that circuit not carrying current, the pull of the other two coils moves the plate and opens contacts which are in the main contactor holding coil circuit. This relay and its diagram of connections are shown in Figure 4.

The manufacturer states this relay also has the advantage of opening the contacts when the currents are unbalanced as much as 50 per cent.

Another feature of value is a set of contacts which close when the relay operates. This makes possible the use of an alarm or signal from either another source of power or a battery, and will thus indicate when the relay has operated to clear single phase supply. It can thus notify the operator or watchman when the motor circuit is open.

Tests were run with one of these relays connected in the holding coil circuit of a five horsepower, 3 phase motor, driving a centrifugal pump and drawing 14.4 amperes per line at 208 volts. The first test was run with the motor idle, one fuse removed, the safety switch open, and the contactor holding coil connected across the two lines which would have full voltage. The open phase protection relay was connected between the contactor and motor, with its reset switch closing the holding coil circuit.

On closing the safety switch, the contactor closed and immediately dropped open, with the protective relay contacts remaining open.

The next tests were with the motor running at full load and then at half load, and one fuse then removed. The protector relay functioned to open the main contactor in both cases.

Another test used the motor running half load, and a fuse was removed from one line to which the magnetic holding coil was attached. The motor contactor opened. This same test was again run without the single phase protector, and the holding coil of the motor contactor held that switch closed, and "chattered" considerably, 156 volts being measured across the coil.

It will be noted these relays range in size from ½ horsepower through 200 horsepower at 220 volts. They will also apply on 550 volt circuits, and the horsepower each relay will handle will increase in proportion to the voltage.

Each leg of the plate which is held by a current coil has a weight attached for balancing purposes. Cases have occurred where the gravity pull of the weights in some vertical positions would hold the switch open on starting. This can be remedied by shifting the center of gravity of the plate with a small washer under the screws holding the relay in its case.

The price to the average industrial customer for the smaller sizes is around $56.

Lighting for selling

(*Continued from page* 19)

sential.

In a fur shop we worked around anemostats in the centers of recessed fluorescent fixtures arranged in an open square pattern, at the corners of which were adjustable highlighters for lighting wall displays. In the rear of the store the general lighting pattern of recessed fluorescent troffers with louvred bottoms was followed in a swastika-like figure which pointed to the elevator directing the flow of traffic to the upper floors.

Fluorescent light was used predominantly for its cold atmosphere while touches of incandescent light at the end of the squares highlighted the showcases and mannequins on the floor.

In designing the lighting for Philipsborn, a Washington department store, we combined fluorescents and incandescents throughout the basement and three floors. Fluorescent fixtures were placed at an angle to direct traffic flow from the elevator to the selling area on the upper floors, while on the first floor the reverse was done, fluorescent fixtures directed traffic to the elevators. Cornice lights were installed throughout the building for wall cases. Adjustable swivel sockets in the windows highlighted display platforms.

We are convinced that the number of lighting schemes are endless, limited only by the imagination and visual interpretation of sound illumination principles which have proven themselves in countless practical applications. We feel the average merchant is very proud of his store and is willing to expend added funds to create something different from his neighbor's establishment. It is good business for him and for the electrical contractor.

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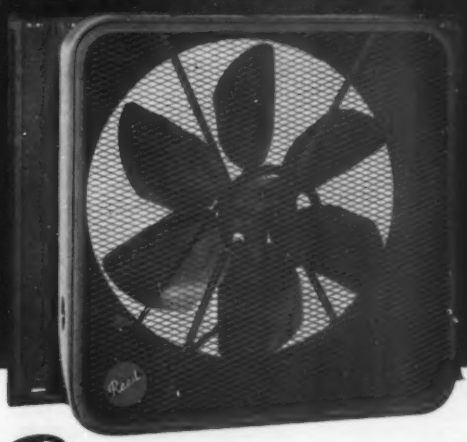

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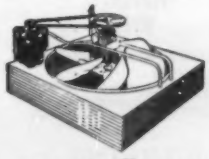

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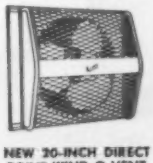

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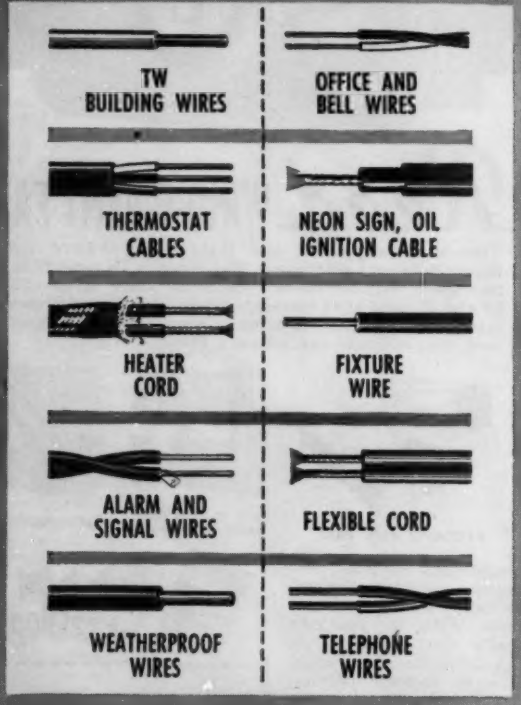

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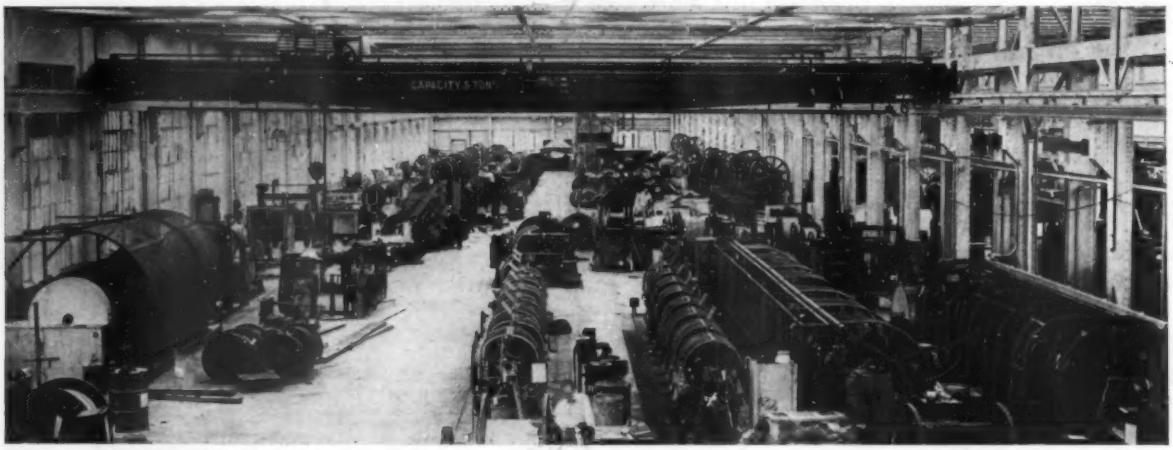

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